



## MARCH-APRIL 2010

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### FROM THE EDITOR'S DESK

**The budget was submitted on schedule in February, and the hearings in Congress are ongoing. \* Read the highlights section for some insight to just what is in that budget request, as well as other articles based on the Congressional hearings \* See RDML Young's Outreach Message for updates on TACSAT 4 and proposed efforts to provide more UHF capability, and accomplishments at the Naval Research Laboratory and with TACSAT 2.**

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## TOP SPACE ITEMS

### PEOPLE

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- [Gen Lew Allen Jr.](#), the 10<sup>th</sup> chief of staff of the Air Force, passed away. Involved in space programs early, Allen oversaw the establishment of Air Force Space Command.
- [LTG Larry Dodgen \(ret.\)](#) died of a heart attack. Dodgen led the Army Space and Strategic Command before retiring in 2007.
- [MajGen Robert M. White \(USAF, ret.\)](#) passed away at the age of 85. In addition to serving as a fighter pilot in WW II (when he was shot down and became as a prisoner of war), Korea, and Vietnam, he became the first to earn a winged astronaut rating by piloting an airplane in space in 1962. The X-15 was the forerunner of the space shuttle, which made its first flight in 1981.
- The Senate has confirmed the following:
  - [Frank Kendall III](#) to be Principal Deputy Under Secretary of Defense for Acquisition, Technology, and Logistics,
  - [Erin C. Conaton](#) to be Under Secretary of the Air Force
  - [VADM David Architzel](#) for reappointment to VADM and assignment as Commander, Naval Air Systems Command. Architzel is currently serving as PDASN (RDA).
  - [VADM Paul Stephen Stanley](#) for assignment as Principal Deputy Director of Cost Assessment and Program Evaluation.
- The President has nominated [VADM James Winnefeld Jr.](#) for a fourth star and assignment as the NORTHCOM/NORAD Commander. Winnefeld is currently serving as the J-5 and as Senior Member, U.S. Delegation to the United Nations Military Staff Committee.
- The SASC has delayed the nomination of [LTG Keith Alexander](#) for his fourth star and position as Commander, U.S. Cyber Command. Several questions have been raised to include:
  - What will be the detailed relationship between CYBERCOM and NSA, which Alexander currently heads
  - Will Alexander will be able to successfully juggle the proposed dual-hatted roles?
- The Satellite Industry Association honored [MajGen Pawlikowski](#), AFRL, as the recipient of the 2010 Satellite Leadership in Government Award for her support of commercial satellite industry.
- [MajGen Susan Mashiko](#) has been reassigned as Deputy Director, National Reconnaissance Office / Commander, Air Force Space Command Element, NRO.
- [Sean Filipowski](#) (RDML sel.) will be assigned as Director, Information Operations, N3IO/ Deputy Director of Naval Intelligence for Cryptology, N2C. Filipowski is currently serving as the NNWC Division Director, Computer Network Operations, N33.
- [RDML Jerry K. Burroughs](#) is assigned as PEO(C3I). Burroughs had previously served as Chief , Engineer Directorate, Code 05, SPAWAR.
- Letitia (Tish) Long, currently Defense Intelligence Agency's Deputy Director, is slated to be the next National Geospatial-Intelligence Agency Director.
  - Long has more than three decades of engineering and intelligence experience, having served as DUSD(I), Deputy Director of Naval Intelligence, and an IC coordinator at the Central Intelligence Agency.

- [VADM Robert Murrett](#), the current NGA Director, will stay on for several months to ensure a smooth transition.
- [Douglas Beason](#) has been assigned as the new chief scientist and technology adviser to the commander of U.S. Air Force Space Command.
- [Mr. Dennis Bauman](#), formerly PEO (JTRS), retired on 3 January. JTRS leadership has transitioned from the Navy to the Army.
- [Defense Science Board membership](#) has been announced to include several names familiar to the space community: the Hon. John Deutch, Jacques Gansler, Donald Kerr, and senior member Gen Larry Welch, just to name a few.

## ORGANIZATIONAL NEWS

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- [Gen James Mattis](#) has requested the name of U.S. Joint Forces Command be changed to U.S. Joint and Coalition Forces Command, reflecting the importance of its multi-national partnerships and signifying a command focused on more than internal U.S. priorities.

## APPROPRIATIONS

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- The [Fiscal Year 2010 Defense Appropriations bill](#) provides \$508B for regular DoD operations and \$128B for the current wars, but not funding for the planned troop surge. The legislation also carried about \$13B in non-defense spending. [Department of Commerce Appropriations report](#) (included in the consolidated appropriations (PL 111-117)), notes concerns with the tri-agency management of NPOESS, and calls for an end to the current 50-50 funding arrangements between DoD and NOAA. This guidance has been incorporated into the Fiscal Year 2011 budget submission.

## FISCAL YEAR 2011

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- The President's Budget delivered to Congress on 1 February continues SBIRS and GPS 3 procurements, and:
  - Includes \$8B in the Air Force budget for space, an 8% decrease from 2010
  - Scales back the 3GIRS program
  - Provides \$94M for ORS, *which is \$30M less than 2010*
  - *Increases the SSA budget to \$426M, with the bulk of the funding directed towards the Space Fence and a follow-on SBSS*
  - Includes funds for a seventh WGS and a fifth MUOS
- In addition to the budget measures outline, [OSTP guidance](#) puts an end to the NPOESS program:
  - The Tri-Agency management structure is being terminated, though DoD, NASA and NOAA will continue to partner in meteorological efforts.
  - Procurements will be split. NOAA and NASA will take primary responsibility for the afternoon orbit, and DOD will take primary responsibility for the morning orbit.
  - DoD will continue to launch DMSP satellites and will perform analysis to support the start of a restructured program in the 4th quarter of fiscal year 2011.

- The SASC Subcommittee on Strategic Forces conducted a hearing on space programs and activities.
  - Included was discussion of rising launch costs, workforce, policy, management and organization, and UHF contingencies.
  - There was concern expressed by the Senators over whether or not Constellation and NPOESS decisions had been coordinated with DoD.
  - [Prepared statements and video webcast](#) are available.
- [HASC Strategic Forces](#) heard from Gen Chilton, who called for better space situational awareness; and PDUSD(P), Miller, who called space a contested arena.
- In the [Senate Commerce, Science & Transportation hearings](#), Sen Bill Nelson questioned heavily the NASA budget, asking for a budget revamp.
- In a [HAC hearing](#), NOAA Administrator Lubchenco said the 2011 budget request includes termination fees for the NPOESS contract, though a final decision to terminate has yet to be made. NOAA's request includes \$1B for the Joint Polar Satellite System.

## DEFENSE REVIEWS

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- Along with the Fiscal Year 2011 budget, the Administration has released a number of strategic reviews:
- The [Quadrennial Defense Review](#)
  - The QDR defines four objectives:
    - ♦ Prevail in today's wars
    - ♦ Prevent and deter conflict
    - ♦ Prepare to defeat adversaries and succeed in a wide range of contingencies
    - ♦ Preserve and enhance the All-Volunteer force
  - Also outlined are six broad mission areas:
    - ♦ Defend the United States and support civil authorities at home (Directives include improve the responsiveness and flexibility of consequence management response forces; enhancing capabilities for domain awareness; pursuit of counter IED technologies, etc.)
    - ♦ Succeed in counterinsurgency, stability, and counterterrorism operations (expanding manned and unmanned aircraft systems for ISR; increasing key enabling assets for special operations forces (SOF))
    - ♦ Build the security capacity of partner states (enhancing linguistic, regional, and cultural ability; strengthening and expand capabilities for training partner forces)
    - ♦ Deter and defeat aggression in anti-access environments (expanding future long-range strike capabilities; assuring access to space and the use of space assets)
    - ♦ Prevent proliferation and counter weapons of mass destruction (establishes a standing Joint Task Force Elimination Headquarters);
    - ♦ Operate effectively in cyberspace (developing) a more comprehensive approach to DoD operations in cyberspace

- Force planning will no longer adhere to the two major regional conflict construct, but build a flexible range of capabilities to respond to priorities and missions.
- The [Ballistic Missile Defense Review](#) was also delivered.
- The Space Posture Review is being delayed to allow for better coordination with the National Space Policy review.
- The Nuclear Posture Review has also been delayed.

## CONGRESSIONAL TESTIMONY: CHINA

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- Speaking before the HASC, the Hon. Wallace Gregson (ASD Asian and Pacific Security Affairs), expressed concerns about China's space program:
  - China has invested heavily in dual-use space programs (reconnaissance, communications and navigation), balanced by a growing capability to threaten and deny access to space by others via direct ascent ASATs, directed energy weapons, and satellite communication jammers.
  - [Prepared statements and the video webcast](#) are available.

## ACQUISITION REFORM

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- The HASC Defense Acquisition Reform Panel has completed work on its [final report](#). Recommendations include:
  - Getting better value from the industrial base
  - Requiring workforce certification and mandatory continuing education
  - Improving its financial management and audit readiness

## SPECTRUM INVENTORY

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- The Senate Committee on Commerce, Science, and Transportation completed work on S. 649, the Radio Spectrum Inventory Act, which would require a biennial inventory of radio spectrum bands managed by NTIA and FCC, and posting of data on the internet.
  - Included would be all bands between 300 MHz and 3.5 GHz. See [Senate Report 111-159](#).
  - The House Committee on Energy and Commerce is working a related bill, H.R. 3125, which would require an inventory of spectrum in the 225 MHz to 10 GHz range.
  - The FCC has now released a National [Broadband](#) Plan to require government agencies to pay for the use of spectrum. In question is spectrum in the 3 MHz to 3 GHz range.

## SPACE FLIGHT SAFETY

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- SES, Intelsat and Inmarsat have announced the establishment of the non-profit Space Data Association (SDA), dedicated to sharing critical operational data and improving flight safety. The SDA will establish a satellite data center in the Isle of Man in 2010.



## U.S. SPACE

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- The White House is expected to complete a review of U.S. space policy soon, setting the stage for a new strategy by mid-2011 that places a high emphasis on international cooperation.
  - Led by Peter Marquez, Director of Space Policy for the White House National Security Council (NSC), the review is addressing a range of topics, including space protection, cooperation, acquisition reform and export controls.
  - Expectations are that National Security Adviser James Jones will fine-tune the report before it goes to the President.
- The National Security Council and the National Economic Council are leading an effort to develop recommendations for a complete overhaul of the export control regime, which will be based largely on prior studies. At the time of this compilation, there has been no public release of specific recommendations from this panel.
- WGS-3 was successfully launched following a series of weather delays.
- JTRS AMF has completed critical design review (CDR).
- STRATCOM has approved a plan to optimize the GPS constellation via a change in the replenishment strategy.
  - The initiative will take up to 24 months to fully implement as satellites are repositioned based on constellation health.
  - The objective is to better serve forces in Afghanistan, but all users, to include civil users, should note improvements.
- The SBIRS GEO-2 satellite has completed its first phase of Baseline Integrated System Test (BIST-1), intended to characterize the overall performance of the satellite.
  - After the completion of all BIST activities, GEO-2 will enter into environmental testing. A 2012 launch is planned.
  - GEO-1 has completed thermal vacuum testing and is scheduled for delivery later this year.
- Critical design reviews for the SBIRS Follow-On Production program for the Highly Elliptical Orbit and Geosynchronous payloads are now complete, and procurement plans include HEO-3 and HEO-4 for flight on a classified host satellite, and GEO-3 and GEO-4.
- The ORS-1 bus is now being prepared for final testing prior to final integration with the payload and launch this year.
  - The bus is based upon the same design employed for TacSat-3, with a new propulsion module.
  - Development of a bus with standardized interfaces is a goal of the ORS program.
  - ORS-1 remains on schedule in spite two focal planes for a secondary payload being damaged by a subcontractor. Spare parts will be used to assemble a replacement unit.
- The Office of Science and Space Technology has released a statement announcing the end of the NPOESS program as it is currently structured.
  - The Tri-Agency management structure is being terminated, though DoD, NASA and NOAA will continue to partner in meteorological efforts.

- Procurements will be split. NOAA and NASA will take primary responsibility for the afternoon orbit, and DOD will take primary responsibility for the morning orbit.
- The agencies will continue to partner in those areas that have been successful in the past, such as a shared ground system.
- DoD will continue to launch DMSP satellites and will perform analysis to support the start of a restructured program in the 4th quarter of fiscal year 2011.
- The [NPOESS precursor program \(NPP\)](#) is now scheduled for launch in late 2011.
- Ongoing problems with the Minotaur 4 rocket will delay by 14 months the launch of SBSS.
  - The Minotaur 4 relies on retired U.S. Peacekeeper missile motors for its first three stages and a commercial fourth stage.
- A contract has now been awarded for the space bus to support the Joint Milli-Arcsecond Pathfinder Survey (JMAPS) mission. The bus will use a design that was developed as part of a Small Business Innovative Research Phase II effort.
- The Air Force has announced the intent to compete the contract for a second SBSS system vice awarding a sole-source contract to Boeing and Ball Aerospace, who produced the first SBSS. The X-37B space plane, also known as the Orbital Test Vehicle arrived in Cape Canaveral in preparation for launch.
  - Managed by the Air Force Rapid Capabilities Office, the OTV program is now undergoing spacecraft processing including checkout, fueling, and integration with the Atlas 5.
  - The 11,000 pound, 29-foot-long, 15-foot-wide vehicle will launch 10PM, Eastern, on April 19 and will land at Vandenberg AFB; flight duration has not been announced.
  - Requirements for the space plane reportedly include the ability to remain on orbit for up to 270 days.
- The Special Sensor Ultraviolet Limb Imager (SSULI), developed by NRL and launched in October on DMSP F18, is entering into the validation and calibration phase. SSULI, capable of taking measurements from the extreme to the far ultraviolet wavelengths, will be used to support operational products and space weather models.
- AFRL recently awarded a contract to Northrop Grumman to design a spacecraft bus with plug-and-play capabilities in order to reduce cost and schedule in developing future space systems. The initial task order includes a six-month study.
- The Solar Ultraviolet Imager (SUVI) for the Geostationary Operational Environmental Satellite (GOES)-R Series, has also completed CDR. SUVI will be used to monitor solar activity and to issue accurate real-time space weather alerts.
- The GAO released a report ([GAO 10-9](#)) in November stating that high transportation costs and inadequate funding may prevent NASA from ever fully utilizing the ISS for science research purposes. Other findings:
  - Uncertainty over the long-term future of the station (beyond the current 2015 U.S. shutoff date) has made it difficult to support scientific users, who need time to replicate their research before it can be published.
  - Under current plans, only 79 percent of the internal payload sites on the station ultimately will be used, and of those only 50 percent are currently required for NASA programs.

- Boeing officially turned over the U.S. on-orbit segment of the ISS to NASA with the signing of government form DD-250 at the conclusion of an Acceptance Review Board meeting.
- NASA has announced it is working with the European Space Agency towards merging their respective Mars exploration programs for missions beginning in 2016. NASA is currently preparing for the launch of the Mars Science Laboratory by late next year.
- NASA's efforts to free the rover Spirit have ended. Spirit became stuck in powdery sand with two wheels no longer working at all.
  - Provided Spirit can survive the Martian winter, it will be refocused on other priorities; researchers will use it to attempt to answer whether the planet has a solid iron core or a liquid one.
  - Designed to last three months, Spirit has been in operation for six years, traveled nearly 12 miles across the surface of Mars and found strong evidence that water once altered the planet's terrain.
- NASA's Wide-Field Infrared Survey Explorer (WISE), launched on 14 December, has now released its first images. [Images from NASA's Wide-field Infrared Survey Explorer \(WISE\)](#) telescope have been released for the first time.
  - WISE will perform the most detailed infrared survey of the entire sky to date, surveying the sky one-and-a-half times in nine months, ending its primary mission when the coolant evaporates away.
  - Other NASA systems credited with making new discoveries are the recently refurbished [Hubble](#), which is sending pictures of new galaxies and [Kepler](#) which has found five new planets.
- NASA officials broke ground near Canberra, Australia, starting a new antenna-building campaign to improve the Deep Space Network communications. The plan includes replacing its fleet of 230-foot-wide dishes with a new generation of 112-foot antennas by 2025.
- NASA's TDRS K-L program successfully completed its system-level Critical Design Review (CDR) and Production Readiness Review (PRR).
- GOES-P was launched on a Delta IV rocket on a mission to monitor rapidly changing atmospheric conditions that spawn hurricanes, tornadoes and floods.
- The [Office of Science and Technology Policy has released a report](#) stating limited demand for rocket engines could slow advanced U.S. propulsion work.
  - From 1999-2008, rocket launches in the United States dropped by half - down from 31 to 15.
  - The current share of commercial launches for the U.S. is about 17%, vice 42% for Russia.
- GeoEye-1 operations have been suspended due to a problem steering the spacecraft's antenna, used to transmit imagery to ground stations.
- SpaceX is now planning a February or March test flight of its first nine-engine Falcon 9 rocket. The rocket could play a major role in delivering supplies to the International Space Station before the U.S. role in the ISS ends in 2015.

- Spaceport America wants to limit the ability of passengers on tourist flights into space to sue; basically passengers willing to be launched into space would agree not to sue the spaceport if anything went wrong. Spaceport America completion is expected by early 2011.

## CONSTELLATION PROGRAM

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- [NASA's budget](#) has been released:
  - The return mission to the Moon, along with Constellation and Ares, is terminated.
  - NASA will rely on the commercial human space flight industry to fill the void when the shuttle program ends this year.
  - Emphasis is on low orbit activities in the near term, and a heavy-lift capability in the future. Investment will be in robotics, propulsion and in-orbit depots
  - In related news, Administrator Bolden was quoted this past week in an international forum as downplaying the role of astronauts, in favor of robotics, in NASA's future.
  - DoD is participating in an interagency team to explore how best to sustain the rocket motor industrial base.
    - ♦ Constellation program cancellation is expected to hurt the industry; the EELV and the Ares V both used RS-68 engines, and the AF is already reporting a per unit price increase.
    - ♦ A report is slated to be delivered to Congress in June, but hearings have already been conducted and Sen. Hutchinson has introduced S 3068, "Human Space Flight Capability Assurance and Enhancement Act of 2010" to extend the shuttle program another year and to ensure NASA continues development of space transportation vehicles.
  - Russia, which will be the only source of flights to the ISS after the last flight of NASA's space shuttles, wants to charge more for rides on its Soyuz rocket.
    - ♦ NASA has signed a deal worth \$306M with Roskomos for six rides to the ISS in 2012 and 2013, or a charge of 51 million dollars per US astronaut.
    - ♦ Russia has justified the planned increase in part due to the need to curtail its space tourism business as the ISS has become more populated.
  - In response to NASA plans, Senator Kay Bailey Hutchinson has introduced S 3068, "Human Space Flight Capability Assurance and Enhancement Act of 2010." The bill would:
    - ♦ Extend the Space Shuttle program through FY 2011, and
    - ♦ Ensure that NASA develops space transportation vehicles, systems and infrastructure to ensure U.S. capability to deliver crew and cargo to LEO and beyond.

## FOREIGN SPACE

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- Bolivian President Morales has signed a decree establishing a national space agency to "promote technology transfer, human-resource development and the application of satellite-communications programs to education, defense, medicine and meteorology."

- The Bolivian Space Agency will manage the Tupac Katari satellite project, scheduled for a 2013 launch; the Tupac Katari is based on the Chinese DFH-4.
  - The agency will have an initial budget of \$1 million and will be financed through government funding, donations and foreign loans.
- The European Commission has indicated that as part of its new security and technology independence policy, it may remove Chinese-built search-and-rescue payloads from their Galileo satellites.
  - Canadian vendors (Canada is an associate member of the European Space Agency) may also be banned from participation in Galileo.
  - China and the EC are now embroiled in a dispute over spectrum usage for their constellations.
- Three contracts have now been signed for the Galileo constellation, to include the procurement of the first 14 satellites (OHB), the launch vehicle (Arianespace Soyuz 2 rocket), and the initial system support service contract (Thales Alenia Space). Satellite control, mission control and operations contracts will be awarded by mid-2010.
- Eumetsat will now delay, at least until June, the kick-off of the Meteosat Third Generation (MTG) system to support medium and long term weather forecasting.
  - All members have approved the requirements, but two have asked to defer the decision on contract proposals. The European Space Agency (ESA) requires unanimous agreement to start the program.
  - If a decision is not made by 30 June, the MTG will likely miss its 2016 launch date.
- A new UK Space Agency will take over responsibility for UK government policy and the key budgets for space, consolidating UK civil space activities under one single management, effective 1 April.
  - While it is not clear that military space activities will be fully absorbed by the new agency, it has also been agreed in principle that the agency will manage the EU Satellite Center budget, currently under the Ministry of Defense.
  - The new agency will handle all UK space negotiations with international partners.
- The Athena-Fidus (Access on THEatres for European allied forces NAtions-French Italian Dual Use Satellite) satellite program has been initiated.
  - Athena-Fidus is planned to be a single geostationary satellite operating in the Ka and EHF bands, and its associated ground control segment. It will complement the French Syracuse 3 and Italian SICRAL-1/1B hardened secure satellites, and the SICRAL-2 program.
  - A 2013 launch is planned and operations will support French, Belgian and Italian armed forces, as well as the civil protection services of France and Italy.
- France has launched Hélios 2B, which will boost operational intelligence for troops on the ground in Afghanistan. Anticipated image resolution is in the tens of centimeters. Other space plans for France include:
  - A Space Joint Command for operations to be created by 1 July. Hélios 2 is operated in cooperation with Belgium, Italy, Greece and Spain.

- A military space budget of 600 million euros (\$900 million) by 2014 (nearly a 60% increase over 2008).
- France has put aside some \$1 billion to buy 14 Soyuz carrier rockets from Russia. The first launch is scheduled for the second quarter of 2010.
- Prime Minister Putin said on Monday that the output of the Russian national space industry in 2009 will increase by about 18%, but noted that the quality of production needs improvement.
- Russia launched six new GLONASS satellites. The launch brings the constellation to 23 working satellites, with two down for maintenance.
- In late January, Russia launched a Proton rocket launched rocket with what is believed to be a modernized Raduga or Globus military communications satellite. The next Proton mission is scheduled for an Intelsat 16 launch in mid-February.
- The head of Russian space agency Roskosmos, Anatoly Perminov, stated the agency is developing plans to deflect an asteroid that will pass close to the Earth around 2030.
  - The asteroid Apophis (Egyptian god of destruction), is about three times the size of the Tunguska meteorite, apparently the cause of a 1908 explosion in Siberia.
  - NASA scientists originally gave Apophis a 2.7 percent chance of hitting Earth on its first approach in 2029, but now say it will pass no closer than 18,300 miles.
  - On a second approach, in 2036, it was originally given a 1-in-45,000 chance of hitting Earth, but the odds were reduced to 1 in 250,000. The odds of impact on its third approach, in 2068, are 1 in 333,000.
  - Mr. Perminov said the plan will involve “no nuclear explosions; everything will be based on the laws of physics.” Once a mission has been developed, Russia will invite NASA, the Chinese and European space agencies to participate.
- A scientific research vessel has arrived at the Russian Antarctic outpost of Bellingshausen on a mission to set up a station for tracking the GLONASS navigation constellation.
  - Russia currently has a total of 22 Glonass satellites in orbit, but only 16 of them are operational; three more satellites are scheduled for launch in March.
  - Glonass system requires 18 operational satellites for continuous navigation services covering the entire territory of Russia and at least 24 satellites to provide services worldwide.
  - Prime Minister Putin was quoted as saying the entire system should be commercialized.
- What was thought to have been remnants of the Russian Cosmos-2421 exploded over Mexico.
  - Civil authorities received reports of a large meteorite crashing to the ground, but searches of the area failed to find the crater reported by numerous people in the area.
  - Cosmos-2421 was launched in 2006 and began to break apart two years later.
- Iranian president Ahmadinejad indicated that Iran may be studying the use of its new space capabilities for a rudimentary anti-satellite weapons capability.
- Iran’s President also unveiled three new satellites (Toulou, Mesbah 2 and Navid), and the Simorgh launch vehicle.
  - Simorgh is designed to lift a 100-kilogram satellite to 500-kilometers.

- Toloo (Dawn) has been hailed by Defense Minister Vahidi as the “new generation” of national satellites in Iran, the satellite has been designed by Iran Electronics Industries, is an imaging satellite;
  - Navid (Good News) is designed to provide store and forward communications services; and
  - Mesbah-2, is another store and forward communications satellite planned for a 2011 launch.
  - Iran's first home-built satellite, the Omid (Hope), was launched in February 2009 to coincide with the 30th anniversary of the Islamic revolution.
  - Launched in early February was Kavoshgan 3 rocket carrying live animals; a rat, two turtles and a worm. Earlier versions of the Kavoshgan were launched in 2008.
- AfricaSat-2 began providing C and Ku-band communications and broad casting services across Africa, Southern Europe and the Middle East.
- Hosted by the Algerian Space Agency with the support of the UN Committee on the Peaceful Uses of Outer Space (COPUOS), the third African Leadership Conference on Space Science and Technology for Sustainable Development met in early December. Two agreements were signed:
  - Algeria and the UN agreed to a Disaster Management and Emergency Response program to be implemented by the UN Office for Outer Space Affairs (UNOOSA).
  - Algeria, Kenya, Nigeria and South Africa agreed to the development of an African Resources Management Satellite Constellation, to make space technology more accessible to end-users in areas such as food security, environmental monitoring, land use, water management and public health.
- Within a one week period China launched Yaogan 7 and 8. These remote sensing satellites were followed in March by Yaogan 9.
  - Launched on the same rocket as Yaogan 8 was Hope 1, described as a small satellite to help students "experience aerospace science and technology".
  - Yaogan 9 will reportedly support science and forecasting of grain production.
- China has launched its third Beidou navigation satellite from the Xichang Satellite Launch Centre in southwestern Sichuan province.
  - The total constellation calls for 35 satellites.
  - Initial operations are anticipated to begin in 2012, with full operations beginning around the 2020 timeframe.
- China has also announced plans to add to their Long March family of launch vehicles with a Saturn V class rocket.
- India has finished development work on its remote sensing Cartosat-2B satellite (1 m resolution) which will be used for military and civil purposes, and may be launched as soon as March.
- India is also developing a weapons system to neutralize hostile satellites operating in low orbit, but no tests are being planned at this time, per the Defense Research and Development Organization Director General Saraswat. Other efforts include means to protect their own satellites.

- The liquid core stage of India's GSLV Mk III launch vehicle developed an anomaly during static testing but is now scheduled to be launched in April. The Mk III is being developed to lift 4 tons to Geo-synchronous Transfer Orbit (GTO).
- New Zealand launched its first rocket, Atea-1 (space in Maori), marking the first time a private company in the southern hemisphere has launched a rocket to space. Intent is to use Atea for small scientific payloads. The first stage booster has been recovered, but the payload and the flight computer have yet to be found.
- The Brunei Authority for Info-communications Technology Industry has hired a European firm to develop a broadband strategy and implementation plan to support access to the next generation information communication technology infrastructure.



## SPACE HIGHLIGHTS

### BUDGET REVIVES DISPUTE OVER NEW SPY SATELLITES

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Chris Strohm [CongressDaily](#)

3 February 2010

The Obama administration's proposed budget for fiscal 2011 has reignited a major dispute over a multibillion-dollar effort to replace the nation's aging spy satellites.

Senate Intelligence ranking member Kit Bond, R-Mo., said Tuesday he was under the impression there was support in the administration for a plan to have the government buy a constellation of small, relatively cheap satellites to support intelligence and military operations. The plan was approved last year by the full committee.

But there was no funding for the plan in the administration's fiscal 2011 budget request released Monday, Bond said during a hearing to examine threats to U.S. national security.

Instead, the budget seeks funding for a different plan called Imagery Way Ahead, which calls for buying large, powerful and expensive electro-optical satellites while purchasing more data from U.S. commercial satellite companies.

Billions of taxpayer dollars are at stake along with major contracting work for defense and intelligence companies and commercial providers of satellite imagery.

Bond said he met last week with the director of the National Reconnaissance Office, retired Air Force Gen. Bruce Carlson. According to Bond, Carlson threw his support behind the Senate Intelligence Committee's plan.

Bond said after Tuesday's hearing he was stunned when he saw the administration's proposed budget for new satellites, the details of which are classified.

But NRO spokesman Richard Oborn disputed Bond's account, saying Carlson "fully supports" the Imagery Way Ahead plan backed by President Obama and senior intelligence officials.

Oborn also said the Senate committee's plan is not a replacement for Imagery Way Ahead.

The issue isn't likely to be resolved soon. When asked his next move, Bond said: "The president proposes; the Congress disposes. I intend to go to work."

During the hearing, the chief witnesses -- Director of National Intelligence Dennis Blair, CIA Director Leon Panetta and FBI Director Robert Mueller -- testified there is a high likelihood that a terrorist attack will be attempted in the United States over the next three to six months.

Blair said recent attempted attacks and successful strikes overseas "represent an evolving threat in which it is even more difficult to identify and track small numbers of [recently trained] terrorists ... and short-term plots than to find and follow terrorist cells engaged in plots that have been ongoing for years."

### 2011 FUNDING REQUEST INCLUDES NEW SAT SYSTEM

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Amy Butler [aviationweek.com](#)

11 February 2010

The Obama administration's proposed 2011 spending plan includes some changes to major missile defense and space programs that emphasize a focus on space situational awareness and ballistic missile tracking capabilities. The proposal also underpins the aging nuclear weapons infrastructure, while adhering to the aim of eventually scrapping nuclear forces altogether and securing so-called nuclear loose material worldwide.

Few new expensive programs are being started in Fiscal 2011, and the most dramatic shift in the funding request is the termination of the joint Defense-Commerce Dept. National Polar-Orbiting Operational Environmental Satellite System.

By contrast, the Air Force is setting aside funding for a follow-on Space-Based Space Surveillance (SBSS) procurement. The first SBSS, a Ball Aerospace/Boeing project that features a two-axis gimbaled visible-light sensor to surveil satellites in geosynchronous orbit, is complete and slated for launch this summer. The follow-on project will include a competition to design more satellites for a constellation, says Gary Payton, deputy undersecretary of the Air Force for space.

The Air Force is requesting \$140.3 million in research and development money to kick off the program. A request for proposals is expected in the fourth quarter of Fiscal 2010 with contract award to follow in the second quarter of Fiscal 2011, according to service officials. Possible competitors include Ball Aerospace, Boeing, Northrop Grumman and Lockheed Martin.

The military space budget is \$11.4 billion, including \$8 billion in research and development or procurement funding, down from \$8.6 billion in 2010, Payton says. One key reduction is the proposed termination of the Third-Generation Infrared Satellite System (3GIRS), which was designed to explore the use of large focal plane array (FPA) infrared detectors for the missile warning role. 3GIRS grew out of concern that the Space-Based Infrared System (SBIRS) missile warning satellites, which have swelled in cost and continually missed schedule targets, would not deliver. But Marilyn Thomas, deputy Air Force budget director, says the 3GIRS termination is possible now because the "SBIRS program is performing well."

Two SBIRS sensors are on classified host satellites in highly elliptical orbit, and the first satellite bound for geosynchronous orbit (to replace Defense Support Program satellites) will be delivered by Lockheed Martin to the Air Force by year-end. Through 3GIRS, the Air Force purchased two FPAs (one from SAIC and another from Raytheon). The SAIC sensor will be launched on a commercial communications satellite by the first quarter of 2011 and work is underway to certify the Raytheon sensor for space.

Though a relatively small amount of money, the Air Force's decision to request \$8.35 million for the Space Protection Program is a first. The program was established by Congress, which directed the Air Force and National Reconnaissance Office to jointly explore space protection needs. This has become an interest item since the Chinese anti-satellite test in early 2007 and the inadvertent collision between an Iridium satellite and defunct Russian spacecraft last year; both incidents created more debris that is dangerous to other satellites. The funding provides for studies and analyses, but it does not indicate a forthcoming procurement.

Another satellite effort gaining steam in Fiscal 2011 is the Missile Defense Agency's new Precision Tracking Space System (PTSS), the goal of which is to demonstrate a midcourse ballistic missile-tracking capability in orbit by 2014. This is part of a larger effort at MDA to improve its sensor network. PTSS will build on lessons from the Space Tracking and Surveillance System satellites (STSS) made by Northrop Grumman and launched last year. Officials have completed about 50% of the functionality testing for these two STSS satellites in low Earth orbit, and \$84 million is requested to continue operating them.

In Fiscal 2012, MDA officials hope to demonstrate the downlink of STSS tracking data in support of an Aegis ballistic missile intercept attempt. The STSS satellites were developed in the 1990s, but only launched last year to allow MDA to test how to track ballistic missiles in the midcourse phase of flight—after the hot motor burns out and while the cooling missile is traveling through the cold backdrop of space.

This mission presents a challenge for traditional infrared cueing and tracking systems. MDA Executive Director David Altwegg says the agency will complete its acquisition strategy for PTSS in about six

months. The PTSS program is slated for \$1.21 billion over five years, including \$67 million in Fiscal 2011.

Another sensor effort at MDA is the first-ever request for the Airborne Infrared (ABIR) program, which will explore the use of unmanned air vehicle (UAV) -mounted infrared sensors for early detection and tracking. This is a key part of MDA's push announced last year to intercept ballistic missiles early in boost, ideally before they reach apogee. MDA is requesting \$501 million over five years, \$112 million in Fiscal 2011, for ABIR.

Altwegg says a platform decision has not been made yet. An analysis of alternatives is underway by MIT Lincoln Laboratories and results are expected in the next couple of months. However, if the Reaper UAV platform is used, the electro-optical/infrared sensor ball would have to be moved about 23 in. forward under the aircraft's nose to provide a better field of view.

This capability could also allow MDA to handle a larger number of missiles launched nearly simultaneously (as threat assessments predict). Three ABIR combat air patrols, each with four platforms, are needed by 2015 to support the fielding of the Phased Adaptive Approach (PAA) missile defense architecture in Europe to protect from an Iranian launch.

MDA's budget is largely focused on continuing to implement the PAA strategy outlined by President Barack Obama in September, which relies heavily on the use of regional defenses, such as the Aegis/SM-3 architecture as well as the Terminal High-Altitude Area Defense program and Patriot/PAC-3 defenses.

MDA is also requesting \$1.05 billion for the land-based Aegis defense system, dubbed Aegis Ashore. In Fiscal 2011, \$281 million is set aside for research and development in preparation for a 2015 deployment to Europe of 24 SM-3 Block IB interceptors, made by Raytheon.

Gone, however, is funding for a new nuclear warhead design, according to Thomas D'Agostino, head of the National Nuclear Security Administration (NNSA), who notes that the Reliable Replacement Warhead, advocated by then-President George W. Bush, is dead. Overall, the White House seeks more than \$7 billion for nuclear weapons activities, up \$624 million from this fiscal year, including more than \$2 billion for stockpile support. Close to \$2.7 billion is requested for NNSA's Defense Nuclear Nonproliferation program, a 25.8% increase over Fiscal 2010.

Obama is also asking for more than \$1 billion for NNSA's Naval Reactors program, a 13.3% year-over-year increase, to support design and development work on the replacement for Ohio-class ballistic missile submarines. Some of the funds also would go to refueling of the S8G land-based nuclear prototype located in upstate New York.

The total request for NNSA is \$11.2 billion, 13.4% more than last year. D'Agostino says this money is needed even as the Obama administration pursues reduction of the nuclear weapons stockpile. "When you have them," he says, "you have to take care of them."

## **DEFENSE SHIFTS FUNDING FOR COMMAND AND CONTROL SYSTEMS IN 2011**

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*Bob Brewin [nextgov.com](http://nextgov.com)  
5 February 2010*

The Army plans to test a satellite-based battlefield communication system that will give commanders the ability to send and receive information at nine times the data rate of the average standard home Internet connection, according to the Defense Department's fiscal 2011 budget for command and control systems.

The Army has started fielding small Ka-band satellite terminals through its Warfighter Information Network-Tactical program, which can provide 56 megabytes per second data rates to combat units when they are stationary, according to the [budget](#).

After testing the system, developed by Lockheed Martin Corp., next year, the Army plans to field terminals in 2012 that will allow the system to be mobile. The Army requested a \$620.9 million budget for WIN-T in fiscal 2011, down 14 percent from the \$725.8 million budget in fiscal 2010.

WIN-T uses the Boeing-developed Wideband Global Satellite System for connectivity, and Defense requested a \$327.7 million budget for the program in fiscal 2011, a 15 percent increase from the \$284.1 million budget in fiscal 2010 for the [space systems budget](#). Defense said the additional funds will support integration and testing of the fourth and fifth wideband satellites and the purchase of two more satellites.

Defense requested \$1.06 billion for the Joint Tactical Radio System for fiscal 2011, up 7 percent from \$990 million in fiscal 2010. JTRS, which Defense started to develop in 1997, is supposed to replace myriad air, naval and ground radio systems with a suite of software-based radios. But in March 2009, the Government Accountability Office [reported](#) that the broadband JTRS radio will not be fielded until at least 2017, 20 years after the program started.

A Navy-managed satellite program designed to provide voice and low data rate service to small shipboard or backpacked ground terminals, called the Mobile User Objective System, would get a modest \$5.6 million increase to \$911.4 million in fiscal 2011 if approved by Congress.

The White House targeted the Pentagon's next generation command and control system, which the Defense Information Systems Agency has been developing since 2006, for termination. The Obama administration said it wanted to kill the Net-Enabled Command Capability "because the program was significantly behind schedule. The program was unlikely to attain its initial operating functionality, and meet the requirements of combat forces, within a reasonable period of time," the budget noted.

DISA said in its [budget request](#) that it intends to add capabilities to the Global Command and Control System-Joint to replace the canceled program and requested \$92.2 million in fiscal 2011, up 21 percent from \$76.1 million in fiscal 2010.

## **NPOESS TERMINATION IMMINENT**

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Amy Butler [aviationweek.com](#)

2 February 2010

The joint Defense and Commerce Dept. National Polar-Orbiting Operational Environmental Satellite System (NPOESS) program of today will be dismantled, though details are still being determined.

The White House Office of Science and Technology Policy has agreed to allow the two departments to embark on separate weather satellite programs to meet their unique needs. The root of this divorce is a mismatch of needs by the two, and a lack of interest by the Defense Dept. to continue keeping its promise of providing 50 percent of the program's funding.

"The new system will resolve this challenge by splitting the procurements," according to a Feb. 1 announcement from OSTP. "NOAA (National Oceanic and Atmospheric Administration) and NASA will take primary responsibility for the afternoon orbit, and DOD will take primary responsibility for the morning orbit. The agencies will continue to partner in those areas that have been successful in the past, such as a shared ground system."

Vice Adm. Steve Stanley, who oversees the Joint Staff's force structure, resources and assessment office, says the contract termination still must be executed with prime contractor Northrop Grumman. Senior Pentagon officials have not ruled out the possibility of buying one or two NPOESS satellites prior to terminating the contract, but a decision has not yet been made.

Northrop Grumman officials say they are “aware of its customer’s plan to restructure the NPOESS program ... During the transition period, the company and NPOESS industry team will continue its progress on the existing program.”

The U.S. Air Force budget includes \$351.8 million for NPOESS in Fiscal 2011. If a termination agreement is reached sooner, the funding could be reallocated to other priorities or a new weather satellite program.

Some government officials have suggested that the Pentagon could go back to the legacy Defense Meteorological Satellite Program (DMSP) satellites, which were made by Lockheed Martin.

The two departments participating in NPOESS — the Pentagon and the Commerce Dept., representing the needs of NOAA — have been coordinating on the project for about 15 years.

The troubled program was born out of an initiative spearheaded by former Vice President Al Gore to merge the weather satellite programs of the two departments, and was to replace both NOAA’s polar-orbiting satellites and the DOD’s Defense Meteorological Support Program spacecraft. NPOESS ran into extensive development problems with its many sensors, causing first launch to slip several years. Developmental challenges and shifts in requirements also prompted total program costs to more than double from their initial \$6.5 billion estimate.

***NSF Editorial Note:*** See the OSTP press release for additional details:

[ostp.gov/galleries/press\\_release\\_files/NPOESS%20Decision%20Fact%20Sheet%20\(2-1-10\).pdf](http://ostp.gov/galleries/press_release_files/NPOESS%20Decision%20Fact%20Sheet%20(2-1-10).pdf)

*Although the OSTP release only traces NPOESS back to 2002, NPOESS was initiated as a result of early 1990’s “convergence” decision, and the establishment of the Integrated program Office (IPO) in 1994.*

## PEO SPACE SYSTEMS

### MARCH 2010 NAVAL SPACE ACQUISITION OUTREACH MESSAGE

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#### *Distinguished Naval Seniors and VIPs:*

My March 2010 edition updates Navy UHF SATCOM activities, potential TACSAT-4 contribution to UHF demand, Software Reprogrammable Payloads, and other items of interest.

#### **Communications Satellite Program Office (PMW-146) Update**

- The first MUOS satellite communications system module has been successfully mated with the propulsion core, allowing the MUOS team to begin environmental testing of the fully integrated satellite. Launch is planned for September 2011.
- Three state-of-the-art MUOS satellite antennas have now been installed at the ground site located in Western Australia. Each of these satellite antennas is 80 feet tall, 60 feet in diameter, weighs 250 tons, and is mounted on a foundation weighing more than 1000 tons.
- USD AT&L signed out the latest MUOS Acquisition Decision Memorandum in late December, authorizing acquisition of satellite #4, launch vehicle #2, and long lead parts for satellite #5. After a Program Review in April 2010, Navy will request authority for acquisition of satellite #5 and the remaining launch vehicles.
- This month a PEO Space Systems team began moving LEASAT-5 to a new orbital slot. After a five-month drift to its new slot at 72E, LEASAT-5's end-of-life will be extended from early 2011 to 2015.
- Correction: My November 2009 edition incorrectly identified the abbreviation "MUOS," which should read "Mobile User Objective System."

#### **TACSAT-4 Military Utility Assessment**

PEO Space Systems is exploring an option with OPNAV (N2/N6) and USSTRATCOM to accelerate the launch and military utility assessment of TACSAT-4 to determine its potential contribution to UHF demand. Although it would provide only limited channel capacity and persistence, TACSAT-4 is already built and scheduled to launch by October 2010. An earlier launch by April 2010 is feasible, provided the priority of TACSAT-4 on the launch manifest is increased.

TACSAT-4 was designed and built by the Naval Research Laboratory for the Operationally Responsive Space (ORS) Office. The Chief of Naval Research, RADM Carr, has been very supportive in ensuring that TACSAT-4 will be ready for an accelerated launch.

#### **Software Reprogrammable Payloads (SRP) Update**

Software Reprogrammable Payloads were developed by the Naval Research Laboratory to enable any satellite or airborne platform to become a collection, exploitation, and dissemination node in a netcentric environment. SRPs, configured to collect the Automatic Identification Signal have been deployed on two Fire Scout UASs (Unmanned Aerial Systems) and are now on sea trials in USS McInerney (FFG-8). The SRP has flown in space on TACSAT-2, on an unmanned surface vessel (Harbor Wing), and on the Navy's Global Hawk UAS. Because it is reprogrammable, the SRP can be reconfigured between or during missions to perform a wide variety of collection, processing, and communications functions. For more information on Software Reprogrammable Payloads, contact Naval Center for Space Technology, Jay Middour, 202-767-6528.

## VIP Assignments, Visits, and Briefings

Maj Gen Susan Mashiko has recently reported as the Deputy Director of the NRO. Maj Gen Mashiko's former assignment was as the Air Force Director for Space Acquisition. Recent VIP visits to NRO include:

- RDML (Sel) Gretchen Herbert, Director Network-Centric Capabilities, N2/N6F1
- RDML (Sel) Sean Filipowski, Director Cyber, Sensors, and Electronic Warfare, N2/N6F3
- RADM Kendall Card, Director Concepts, Strategies and Integration, N2/N6F
- RADM Janice Hamby, Vice Director C4 Systems, Joint Staff, J6, briefed at Aerospace Defense Facility-West
- Commodore John Bruening, COMPHIBRON 8, staff, and CO's of USS Ashland and USS San Jacinto

NNCG (Naval-NRO Coordination Group) briefed the USW Recon Conference at Navy Mine and ASW Command on a Navy-NRO proposal for Multi-INT support to Undersea Warfare.

## Reflections

As indicated by the number of OPNAV N2/N6 flags who have visited NRO recently, our National/Navy space acquisition community is well along in connecting with the new OPNAV Information Dominance leadership. Having a single focal point within OPNAV for C4 and Intelligence, for both space and airborne platforms is fostering awareness of national space capabilities and emerging technologies that are relevant to the Navy's hard problems.

The standup of Cyber Command/Tenth Fleet on 29 January is another opportunity to help ensure a smooth interface with National Security Space Programs. Serving as the transport layer for information traveling to and from afloat forces, space is commingled with cyber, for C4I and for offensive and defensive IW.

I look forward to working with Cyber Command and to continue building relationships with the information leadership in the Navy Secretariat, OPNAV, and the fleet to make space an integral part of our IW capabilities. The NNCG, co-chaired by CAPT Jim Hirst and Mr. Wayne Tunick, will be my lead working with Cyber Command, N2/N6, and DASN (C4I, IO, and Space).

My April 2010 Outreach Message will be distributed on SIPRnet and will include details of the above-mentioned Multi-INT USW proposal and other interest items. If you are not receiving the bi-monthly classified edition please send me your SIPRnet address.

Very respectfully,

Liz Young  
RDML, USN  
*PEO Space Systems*  
*Commander, SPAWAR Space Field Activity*  
*Director, Systems Engineering Directorate, NRO*  
*Chantilly, VA*



## KEY INTEGRATION MILESTONES ON FIRST MOBILE USER OBJECTIVE SYSTEM SATELLITE

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[californiaspaceauthority.org](http://californiaspaceauthority.org)

20 January 2010

Lockheed Martin announced today that it has successfully mated the first Mobile User Objective System (MUOS) satellite's high-performance communications system module with the propulsion core at its facilities in Sunnyvale, Calif. Supporting ultra-high frequency (UHF) satellite communications (SATCOM), MUOS will provide assured communications, including simultaneous voice, video and data, for mobile warfighters.

The MUOS system module, developed and tested at Lockheed Martin's facilities in Newtown, Pa., includes a legacy UHF payload provided by Boeing Satellite Systems (BSS), El Segundo, Calif., that is compatible with more than 10,000 deployed UHF SATCOM terminals that will transition to MUOS as existing UHF Follow-on (UFO) satellites reach the end of their on-orbit life. It also features a Lockheed Martin-built wideband code division multiple access payload that incorporates advanced technology to provide a 16-fold increase over legacy UHF SATCOM in the number and capacity of satellite links. These technologies will support new mobile satellite terminals that are under development within the Joint Tactical Radio System.

The propulsion core contains the integrated propulsion system and serves as the structural backbone of the satellite. Developed and tested at Lockheed Martin's Mississippi Space & Technology Center, the propulsion subsystem is essential for maneuvering the MUOS satellite during transfer orbit to its final location as well as conducting on-orbit repositioning maneuvers throughout its mission life.

"The successful mate of the system module with the spacecraft's propulsion core is another major milestone for the team and a critical step forward in our objective to successfully deploy MUOS for the warfighter," said Mark Pasquale, Lockheed Martin's MUOS program manager and vice president. "We look forward to executing the critical integration and test work at hand and achieving operational excellence and mission success for our customer."

The successful mate allows the MUOS team to begin environmental testing of the fully integrated satellite. The first MUOS satellite, along with the associated ground system provided by General Dynamics C4 Systems, Scottsdale, Ariz., are scheduled for on-orbit hand-over to the Navy in 2011.

Lockheed Martin Space Systems, Sunnyvale, Calif., is the MUOS prime contractor and system integrator. The Navy's Program Executive Office for Space Systems, Chantilly, Va., and its Communications Satellite Program Office, San Diego, Calif., are responsible for the MUOS program

## US NAVY SURVEYS STARS TO BETTER TRACK SPACE OBJECTS

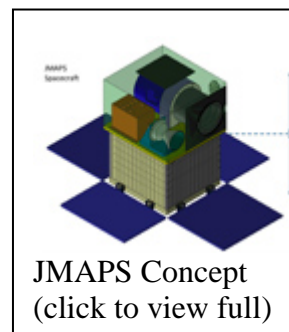
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[defenseindustrydaily.com](http://defenseindustrydaily.com)

25 March 2010

The US Navy is undertaking a bright star survey called the Joint Milli-Arcsecond Pathfinder Survey (JMAPS) mission. The survey will be carried out by a microsatellite containing a telescope set for launch in 2012. The JMAPS mission is intended to improve [space situational awareness](#), in particular tracking space objects.

To build the telescope's bus, the Navy is contracting with AeroAstro in Ashburn, VA. On March 25/10, the company received a \$37.9 million cost-plus-fixed-fee contract to supply its low-jitter JMAPS spacecraft bus.





The bus will contain solar panels and will house the power, avionics, communications, thermal control, and inertial measurement units. The instrument/payload deck, which sits on top of the bus, will contain the optical telescope and electronics

The JMAPS bus will be designed, built, and tested by AeroAstro, and will use the spacecraft conceptual design that was developed during Phase II of a small business innovative research (SBIR) effort.

## MAJOR SPACE CONTRACTS

*Unless otherwise noted, all items are as reported by OASD (Public Affairs) <[defenseink.mil](http://defenseink.mil)>*

### COMMUNICATIONS COMMAND AND CONTROL

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30 Nov 2009. ITT Corp.'s NexGen Communications in Dulles, VA received a \$9.7 million firm-fixed-price contract to supply 1,450 distributed tactical communication systems-radio only (DTCS-RO) communication devices to the US Navy. The DTCS-RO communication devices are hand-held, beyond line-of-sight, push-to-talk tactical radios that use the Iridium satellite system. The device provides voice communications and Blue Force tracking, which provides US soldiers on the move, near real-time, situational awareness by showing where friendly and enemy units are located. *Source: [defenseindustrydaily.com](http://defenseindustrydaily.com) Note: Date above reflects date of announcement vice actual award date.*

1 Dec 2009. Lockheed Martin Space Systems Co., Sunnyvale, Calif., was awarded a \$57,300,000 contract which provides non-personal services to support the operations and sustainment of Milstar and the Defense Satellite Communications System for the next eight months. At this time, \$28,650,000 has been obligated. HQ MCSW/PK, El Segundo, Calif., is the contracting activity (FA8808-10-C-0002).

1 Dec 2009. Lockheed Martin Corp., Sunnyvale, Calif., was awarded a \$39,500,000 contract which provides contractor sustainment for the AEHF satellite ground segment from Dec. 1, 2009, to Sep. 30, 2010. At this time, \$39,500,000 has been obligated. MCSW/PKA, El Segundo, Calif., is the contracting activity (F04701-02-C-0002, P00399).

3 Dec 2009. Iridium Communications and ITT Corp. received a \$9.7 million contract from the U.S. Naval Surface Warfare Center (NSWC) to supply 1,450 Iridium-based DTCS-RO handheld tactical satellite transceiver devices for use by U.S. forces in Iraq and Afghanistan, ITT announced Dec. 2. The DTCS-RO handheld push-to-talk radios use the Iridium satellite network to provide over-the-horizon, beyond-line-of-sight tactical networks for warfighters on the move. ITT will manufacture and deliver the transceivers by March. In June, NSWC awarded Iridium a five-year development contract valued at up to \$21.7 million for Phase Two of the DTCS program, also known as Netted Iridium. *Source: [satellitetoday.com](http://satellitetoday.com) Note: Date above reflects date of announcement vice actual award date.*

12 Dec 2009. TeleCommunication Systems Inc., a provider of mission-critical wireless communications, won a three-year, \$5.9 Million contract incrementally funded at \$2 million from the Defense Information Technology Contracting Office (DITCO) to provide the U.S. Army Central Command (CENTCOM) with space segment for its Afghanistan operations. This is a three-year contract if all options are exercised. CENTCOM is funding this procurement through GSA's SATCOM II contract vehicle. *Source: [mae.pennnet.com](http://mae.pennnet.com) Note: Date above reflects date of announcement vice actual award date.*

13 Dec 2009. Raytheon Co. Command and Control Systems segment in Marlborough, Mass., is working the development of an open-architecture software defined radio (SDR) system to supplement or replace Navy satellite communications under terms of a \$9.5 million research contract announced Friday. The contract, awarded by the Office of Naval Research in Arlington, Va., is for SDR communications at RF frequencies of 2 GHz and above to improve Navy tactical data communications for mobile, high throughput networking for platform-to-platform military communications with or without the use of satellites. This SDR research is part of the Navy's High Throughput Networking Infrastructure research initiative to enhance tactical communications among surface ships, aircraft, and ground sites for intelligence, surveillance, and reconnaissance in case Navy communications by satellite are degraded or unavailable. *Source: [mae.pennnet.com](http://mae.pennnet.com) Note: Date above reflects date of announcement vice actual award date.*

16 Dec 2009. Delta Wave Communications, Inc., Morgan City, La., was awarded on Dec. 11, 2009, a \$6,000,000 firm-fixed-price contract. This contract is for the U.S. Army Corps of Engineers, Engineer

Research and Development Center (ERDC). The ERDC leverages commercial satellite access in order to facilitate reach-back communications. In order to continue efforts in this area, ERDC must have International Mobile Satellite Organization mobile satellite services. Work is to be performed in Morgan City, La., with an estimated completion date of Dec. 16, 2010. Bids were solicited on the World Wide Web with one bid received. U.S. Army Corps of Engineers, ERDC, Vicksburg, Miss., is the contracting activity (W912HZ-09-C-0014).

*14 Jan 2010.* ViaSat, Carlsbad, Calif., is being awarded a \$14,351,804 firm-fixed-price order for Multifunctional Information Distribution System Joint Tactical Radio System (MIDS JTRS) limited production terminals. The MIDS JTRS terminal is a software communications architecture compliant upgrade to the MIDS-Low volume terminal that supports legacy and advanced networking JTRS compliant waveforms enabling integrated navigation, identification, voice and data communications, information security, networking, and networking applications to meet Department of Defense software defined radio initiatives and requirements. Work will be performed in Carlsbad, Calif. (35 percent), in various other sites within the U.S. (65 percent), and is expected to be completed by December 2010. This order was competitively procured with two proposals solicited and two offers received. The synopsis was released via the Federal Business Opportunities Web site. Space and Naval Warfare Systems Command, San Diego, Calif., is the contracting activity (N00039-00-D-2101).

*26 Jan 2010.* Intelsat General Corp., 6550 Rock Spring Drive, Suite 450, Bethesda, MD 20817-1112, was awarded a contract for the guaranteed minimum of \$10 million, firm-fixed-price, Indefinite Delivery/Indefinite Quantity contract for the Space and Naval Warfare Systems Command's Commercial Broadband Satellite Program on Jan. 25, 2010. The contract, with a not-to-exceed ceiling of \$542.7 million, provides worldwide commercial telecommunications services to include: C, Ku, and X-band satellite resources, land earth stations, terrestrial backhauls, and bandwidth management services. The period of performance is Jan. 26, 2010 through Jan. 25, 2015 (a one-year base with four one-year options). Performance will be at various locations around the world. The solicitation was issued as a full and open competitive action. Solicitation was posted to FEDBIZOPPS. Five offers were received. The Defense Information Technology Contracting Organization, Scott AFB Ill., is the contracting activity. Contracting point of contact is Karen E. Kincaid at 618-229-9451 (HC1013-10-D-2000).

*29 Jan 2010.* Boeing Satellite Systems, Inc., El Segundo, Calif., was awarded a \$21,000,000 contract which will provide a change order to the Wideband Global Satellite Communications to integrate, test, and store the 1.5 ship-sets of xenon-ion propulsion systems hardware procured. At this time, \$14,000,000 has been obligated. MCSW/PKW, El Segundo, Calif., is the contracting activity (FA8808-06-C-0001,P00070).

*26 Feb 2010.* Comtech Mobile Datacom Corp., Germantown, Md., was awarded a \$13,750,000 firm-fixed-price contract for the satellite bandwidth, engineering, services and support for Force XXI Battle Command Brigade and Below (FBCB2) and Blue Force Tracking (BFT) systems. This is for the continued support of all FBCB2/BFT channels employed worldwide for six months, with one new channel spanning nine months, and support of new software version 6.5. Work is to be performed in Germantown, Md., with an estimated completion date of Dec. 2010. One bid was solicited with one bid received. CECOM Acquisition Center, Fort Monmouth., N.J., is the contracting activity (W15P7T-07-D-J402).

*5 Mar 2010.* Lockheed Martin Corp., Moorestown, N.J., is being awarded a \$10,232,032 cost-plus-fixed-fee task order # 0002 under previously awarded contract (N00014-09-D-0702) for the Integrated Topside program. This task order supports the technology development phase of a Navy acquisition program to develop a satellite communication prototype/advanced development model system suitable for integration into Navy submarines. This contract contains options which, if exercised, will bring the value of the contract to \$32,003,899. Work will be performed in Moorestown, N.J., and work is expected to be completed March 2011. With options exercised, the completion date is July 2013. Contract funds

will not expire at the end of the current fiscal year. The Office of Naval Research, Arlington, Va., is the contracting activity.

*16 Mar 2010.* The US Defense Information Systems Agency (DISA) awarded a contract worth up to \$50 million to MTN Government Services (MTNGS), a subsidiary of Miramar, FL-based MTN Satellite Communications (MTN), to provide global broadband satellite services. Under the firm, fixed-price, 5-year contract, MTNGS will supply global C- and Ku-band satellite bandwidth to the agency. The initial 6-month award is for \$6.5 million. The contract includes 5 options, which if exercised, will bring the total contract value to \$50 million. *Note: Date above reflects date of announcement vice actual award date.* *Source: [defenseindustrydaily.com](http://defenseindustrydaily.com)*

*22 Mar 2010.* Raytheon Co., Marlborough, Mass., is being awarded a \$28,144,958 firm-fixed-price modification to a previously awarded contract (N00039-08-C-0115) for eight Submarine High Data Rate Antenna Systems. Work will be performed in Marlborough, Mass. (69 percent) and St. Petersburg, Fla. (31 percent), and is expected to be completed by December 2010. Contract funds will not expire at the end of the current fiscal year. This contract was not competitively procured because Raytheon developed the submarine antenna under contract N00039-04-D-0033, which was competitively awarded Oct. 23, 1996. The Space and Naval Warfare Systems Command, San Diego, Calif., is the contracting activity.

*23 Mar 2010.* Raytheon Defense and Civil Missions Solutions, Falls Church, Va., is being awarded a \$15,397,523 firm-fixed-price contract to produce Global Broadcast Receive Suites for the Global Broadcast Service (GBS) program. Work will be performed in Falls Church, Va. (82.5 percent), and Reston, Va. (12.5 percent) and is expected to be completed by March 2012. Contract funds will not expire at the end of the current fiscal year. This contract was not competitively procured. The Space and Naval Warfare Systems Command, San Diego, Calif., is the contracting activity (N00039-10-C-0059).

## IMAGERY

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*31 Dec 2009.* The U.S. National Geospatial-Intelligence Agency (NGA) has awarded three indefinite-delivery, indefinite-quantity contracts for Commercial Satellite Synthetic Aperture Radar (COMSAR) imagery, data products, and direct downlink services, the agency announced Dec. 29. MDA Geospatial Services, EADS North America, and Lockheed Martin each won an NGA contract that includes a five-year ordering period with a guaranteed minimum of \$10,000 and a maximum ceiling of \$85 million. The agency said that the contracts improve its ability to provide intelligence in low light and bad weather conditions. NGA and its partners aim to utilize COMSAR data for U.S. intelligence, military and homeland security applications. *Source: [satellitetoday.com](http://satellitetoday.com)* *Note: Date above reflects date of announcement vice actual award date.*

## SPACE BASED SURVEILLANCE

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*3 Dec 2009.* Northrop Grumman Space and Mission Systems, Carson, Calif., was awarded a \$43,983,875 contract which will provide for a space based surveillance satellite. At this time, \$4,713,395 has been obligated. SMC/SYSW of El Segundo, Calif., is the contracting activity (F8819-04-C-0002).

*15 Jan 2010.* Boeing Co., Seal Beach, Calif., was awarded a \$30,879,365 contract which will exercise the option for CY2010 maintenance and operations services to provide the requirements for the development and delivery of the logistics infrastructure for the Space Based Space Surveillance Block 10 system. At this time, \$7,756,737 has been obligated. SMC/SYSW, El Segundo, Calif., is the contracting activity (FA8819-08-C-0006, P00014).

## WEATHER

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29 Jan 2010. Lockheed Martin Corp., Sunnyvale, Calif., was awarded an \$85,400,000 contract which will modify the spacecraft integration and test contract for the Defense Meteorological Satellite Program to include tasks associated with revising the launch dates for Flight 19 and Flight 20 and rephrasing of the contract consistent with the revised launch dates. At this time, no money has been obligated. SMSC/DMSF, El Segundo, Calif., is the contracting activity (F04701-02-C-0003, P00157).

## NAVIGATION

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5 Feb 2010. Boeing Co., Seal Beach, Calif., was awarded a \$75,939,504 contract which will provide for Global Positioning Satellite GPS IIF Space Vehicle, sustainment and operational control segment support for calendar year 2010. At this time, \$25,000,000 has been obligated. GPSW/PK, El Segundo, Calif., is the contracting activity (F04701-96-C-0025, P00532).

## LAUNCH AND LAUNCH SUPPORT

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1 Dec 2009. United Launch Services, LLC, Centennial, Colo., was awarded a \$16,024,713 contract which provides the final close out of the Medium Launch Vehicle (MLV) III Delta II contract and transfer of required MLV III assets to a NASA contract. At this time, \$16,024,713 has been obligated. LRS/PK, El Segundo, Calif., is the contracting activity (F04701-93-C-0004, P00386).

4 Jan 2010. Booz Allen Hamilton was awarded a four-year \$38.4 million contract to provide launch and test range system engineering and integration support to the U.S. Air Force Space and Missile Systems Center in Los Angeles, Booz Allen Hamilton announced Jan. 4. Booz Allen will lead a team, which includes Lockheed Martin and Arinc, in providing the required support to modernize the spacelift range enterprise by putting structures, processes and tools into place that will aim to increase the reliability, maintainability, availability, and dependability of the operating systems. The contract also aims to provide a risk reduction and capability maturation program to develop and maintain the current and future architectures of communications and weather assets for space missions, which are currently located at Patrick Air Force Base, Fla. and Vandenberg Air Force Base, Calif. *Source: [satellitetoday.com](http://satellitetoday.com) Note: Date above reflects date of announcement vice actual award date.*

3 Feb 2010. Spaceport Systems International, Lompoc, Calif., was awarded a \$48,000,000 contract which will provide for future launch spaceport services for the Launch Test Squadron within the Space and Missile Systems Center/Space Development and Test Wing. At this time, \$300,000 has been obligated. SMC/PKN, Kirtland, N.M., is the contracting activity (FA8818-10-D-0022).

18 Feb 2010. United Launch Services, Littleton, Colo., was awarded a \$6,300,000 contract which will provide for phase two of the enhancement of Delta IV launch operations capabilities for FY 10. At this time, \$4,725,000 has been obligated. SMC/LR, El Segundo, Calif., is the contracting activity (FA8816-06-C-0002).

8 Mar 2010. United Launch Services, Littleton, Colo., was awarded a \$6,502,811 contract which will provide new capabilities, tools, or resources required to increase the Evolved Expendable Launch Vehicle. At this time, the entire amount has been obligated. SMC/LR, El Segundo, Calif., is the contracting activity (FA8816-06-C-0003).

17 Mar 2010. United Launch Services, Littleton, Colo., was awarded a \$15,065,010 contract which will provide for the acquisition of launch vehicle propellants and gaseous commodities for Air Force space missions. At this time, \$15,065,101 has been obligated. SMC/LRSW, El Segundo, Calif., is the contracting activity (FA8816-06-C-0002, P00194).

23 Mar 2010. Mantech SRS Technologies, Inc., of Arlington, Va., was awarded a \$15,422,664 contract which will provide system engineering and integration services to support launch and range systems wing by providing space launch operations for current and future launches. At this time, the entire amount has been obligated. SMC/LRSW, El Segundo, Calif., is the contracting activity (FA8811-10-C-0002).

23 Mar 2010. United Launch Services of Littleton, Col., was awarded an \$18,377,691 contract which will support the Department of Defense's assured access to space efforts by implementing FY10 Project Improvement-Ordnance Box and FY10 Fleet Standardization-Metallic LOX Skirt capability improvement projects under the Evolved Expendable Launch Vehicle Launch Capabilities contract. At this time, \$9,952,220 has been obligated. SMC/LR, El Segundo, Calif., is the contracting activity (FA8816-06-C-0002).

## SPACE SYSTEMS / SPACECRAFT TECHNOLOGY

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2 Dec 2009. Northrop Grumman will help the Air Force Research Laboratory (AFRL) design a spacecraft "bus" with plug-and-play capability to reduce cost and schedule in developing future space systems. Northrop Grumman has been awarded an initial \$500,000 task order for a six-month study under the AFRL's Plug-and-Play Spacecraft Technologies program. The company will deliver the study to the AFRL's Space Vehicles Directorate at Kirtland Air Force Base, N.M. The task order was awarded under an indefinite delivery/indefinite quantity (ID/IQ) contract with a ceiling of \$200 million. *Source: [irconnect.com/noc/press](http://irconnect.com/noc/press) Note: Date above reflects date of announcement vice actual award date.*

21 Dec 2009. Orbital Sciences was awarded a \$74.6 million Phase 2 contract by the U.S. Defense Advanced Research Projects Agency (DARPA) to develop the final design for the System F6 spacecraft. Orbital will partner with IBM and the NASA Jet Propulsion Laboratory on the project and will be responsible for the detailed design and ground testing of the new technologies, architectures and programmatic concepts required to successfully fractionate a space system. These technologies include wireless data communications, cluster flight operations, distributed spacecraft computing systems, rapidly relocatable ground systems and value-centric design methodologies. The System F6 program aims to develop and demonstrate the basic building blocks of a new space architecture in which traditional large, multi-functional monolithic spacecraft are replaced by clusters of wirelessly interconnected spacecraft modules. A System F6 flight demonstration is planned for 2013. *Source: [satellitetoday.com](http://satellitetoday.com) Note: Date above reflects date of announcement vice actual award date.*

22 Dec 2009. Americom Government Services, McLean, Va., is being awarded an \$18,750,000 contract to provide for an experimental sensor on a commercial spacecraft manifested for launch in 2010. At this time, \$5,000,000 has been obligated. SMC/XRC, El Segundo, Calif., is the contracting activity (FA8814-08-C-0001, P00009).

## OPERATIONS & SYSTEMS SUPPORT

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29 Dec 2009. Integral System, Inc., Lanham, Md., was awarded a \$13,586,952 contract, with a modification exercising option CLIN 1004, for sustainment calendar year 2010 in support of the Command and Control System-Consolidated program and includes program management; hardware and software maintenance updates; core and satellite vehicle-specific software maintenance; database maintenance; and operations support for Satellite Operations Center block at Schriever Air Force Base, Colo. At this time, \$2,300,000 has been obligated. Space and Missiles Systems Center, Military Satellite Communication Systems Wing, El Segundo, Calif., is the contracting activity (F04701-01-C-0012).

15 Jan 2010. SRI International, Menlo Park, Calif., is being awarded an \$8,957,506 cost-plus-fixed-fee completion contract for the research and development for low frequency, high power satellite calibration



service and software development support. This research and development covers the effort required to support the development of various ground support systems which provide support to space and airborne systems. Work will be performance in State College, Pa. (81 percent) and Menlo Park, Calif. (19 percent), and work is expected to be completed January 2015. Contract funds in the amount of \$22,000 will expire at end of current fiscal year. The contract was procured under Request for Proposal Number N000173-09-R-RS02 on the basis of other than full and open competition in accordance with FAR 6.302-1 and one offer was received. The Naval Research Laboratory, Washington, D.C., is the contracting activity (N000173-10-C-6005).

28 Jan 2010. Miltec Corp., a subsidiary of *Ducommun Inc.*, announced that AFRL's Space Vehicles Directorate awarded the company a 5-year indefinite-delivery/ indefinite-quantity [\[plug and play\]](#) PNP satellite development contract with a ceiling of \$200 million. The 1st order under the contract is to conduct a study and demonstration phase to support the development of the advanced PNP satellite architecture. A subsequent task order is anticipated to include the development of a PNP satellite demonstration bus. The AFRL's Advanced PNP Spacecraft Technologies Program is carrying out research, development, and design to support PNP technology development, including satellite busses, components, payloads, and flight and ground software. *Source: [defenseindustrydaily.com](http://defenseindustrydaily.com) Note: Date above reflects date of announcement vice actual award date*

25 Feb 2010. Raytheon Co., Aurora, Colo., was awarded an \$886,440,679 contract which will provide for command, control and mission support for the Block II and Block III family of satellites; support existing and new interface; and support the evolution of the systems to a net-centric paradigm. At this time, \$300,000 has been obligated. 55 CONS/LGCD, Offutt Air Force Base, Neb., is the contracting activity (N61339-03-D-0300). *NSF Editorial Note: This contract is in support of the OCX command and control system for the GPS program.*

23 Mar 2010. Honeywell Technology Solutions, Inc., of Colorado Springs, Col., was awarded a \$26,900,000 contract which will provide the Hawaii Tracking Station part of the Air Force satellite control network. At this time, the entire amount has been obligated. SCNG/PK, El Segundo, Calif., is the contracting activity (FA4701-02-D-0006).



## Status of the Navy

As of March 30, 2010

### Navy Personnel

- Active Duty: 330,274: ↓
  - Officers: 51,696 ↓
  - Enlisted: 274,120 ↑
  - Midshipmen: 4,458 ↓
- Ready Reserve: 103,494 [As of 10 Feb 2010]: ↓
  - Selected Reserves: 65,982 ↑
  - Individual Ready Reserve: 37,512 ↓
- Reserves Currently Mobilized: 6,153 [As of 23 Mar 2010] ↓
- Personnel on Deployment: 43,971 ↓
- Navy Department Civilian Employees: 192,652

### Ships & Submarines

- Deployable Battle Force Ships: 286 ↑
  - Ships Underway: 162 ships (57 % of total) ↑
  - On deployment: 111 ships (39% of total) ↑
  - Attack Submarines Underway: 31 subs (56%) ↑
  - On deployment: 20 subs (37%) ↑

Note: ↓ ↑ Indicates direction of change since last NSF

### Ships Underway (continued)

- Amphibious Warfare Ships
  - USS Nassau (LHA 4) - 5th Fleet
  - USS Peleliu (LHA 5) - Pacific Ocean
  - USS Bonhomme Richard (LHD 6) - 3rd Fleet
- Haiti Humanitarian Aid/Disaster Relief
  - USS Bataan (LHD 5)
  - USS Lewis and Clark (T-AKE 1)
  - USNS Grasp (T-ARS 51)

### Aircraft 3700+

### Ships Underway

- Carriers:
  - USS Dwight D. Eisenhower (CVN 69) - 5th Fleet
  - USS Carl Vinson (CVN 70) - port visit Callao Peru
  - USS John C. Stennis (CVN 74) - Pacific Ocean
  - USS Harry S. Truman (CVN 75) - Atlantic Ocean



## SPACE CONFERENCES AND SYMPOSIA

- **26<sup>th</sup> National Space Symposium – 12-15 Apr**  
*Broadmoor Hotel, Colorado Springs, CO*  
[spacesymposium.org](http://spacesymposium.org)
- **Military Satellite Communications in a Net-Centric Environment – 12-16 Apr**  
*AFCEA Headquarters, Fairfax VA*  
[afcea.org/education/details.cfm?course\\_number=10302-BW](http://afcea.org/education/details.cfm?course_number=10302-BW)
- **2010 CubeSat Developers' Workshop – 21-23 Apr**  
*Cal Poly, San Luis Obispo*  
[cubesat.org/index.php/workshops/upcoming-workshops](http://cubesat.org/index.php/workshops/upcoming-workshops)
- **Space Ops – 25-30 Apr**  
*Huntsville, AL*  
[aiaa.org](http://aiaa.org)
- **Military Satellites Summit – 27-28 April**  
*Washington DC*  
[militarysatellitessummit.com/Event.aspx?id=261828](http://militarysatellitessummit.com/Event.aspx?id=261828)
- **4<sup>th</sup> International Conference on Astrodynamics Tools and Techniques – 3-6 May**  
*Madrid, Spain*  
[congrex.nl/10a08](http://congrex.nl/10a08)
- **Navy League Sea-Air-Space 2010 – 3-6 May**  
*“Responding Globally” Gaylord National Resort and Conference Center, National Harbor, MD*  
[seaairspace.org](http://seaairspace.org)
- **DISA Customer Partnership Conference – 3-7 May**  
*Gaylord Opryland Hotel and Convention Center, Nashville, TN*  
[disa.mil/conferences/2010/index.html](http://disa.mil/conferences/2010/index.html)
- **International Association for the Advancement of Space Safety (IAASS) – 19-21 May**  
*Huntsville, AL*  
[iaass.org/event.aspx?t=16](http://iaass.org/event.aspx?t=16)
- **29<sup>th</sup> Annual International Space Development Conference – 27-31 May**  
*InterContinental Chicago O'Hare Airport Hotel, IL*  
[isdc.nss.org/2010/?page=schedule](http://isdc.nss.org/2010/?page=schedule)
- **2010 Joint Navigation Conference – 7-10 Jun**  
*Wyndham Orlando Resort, FL*  
[ion.org/meetings/jnc2009/index.cfm](http://ion.org/meetings/jnc2009/index.cfm)
- **National Security Space Policy & Architecture Symposium – 29-30 Jun**  
*Northrop Grumman Heritage Conference Center, Chantilly, VA*  
[ndia.org/meetings/0340/Pages/default.aspx](http://ndia.org/meetings/0340/Pages/default.aspx)
- **AIAA/AAS Astrodynamics Specialist Conference – 2-5 Aug**  
*Sheraton Centre Toronto, Ontario, Canada*  
[aiaa.org/content.cfm?pageid=230&lumeetingid=2112&viewcon=submit](http://aiaa.org/content.cfm?pageid=230&lumeetingid=2112&viewcon=submit)

- **13<sup>th</sup> Annual Space and Missile Defense Conference & Exhibition – 16-19 Aug**  
*Von Braun Center, Huntsville, AL*  
[smdconf.org](http://smdconf.org)
- **AIAA SPACE 2010 Conference & Exposition – 31 Aug - 2 Sep**  
*Anaheim Convention Center, Anaheim, CA*  
[aiaa.org/content.cfm?pageid=230&lumeetingid=2387](http://aiaa.org/content.cfm?pageid=230&lumeetingid=2387)
- **AIAA SPACE 2010 Conference & Exposition/28<sup>th</sup> AIAA International Communications Satellite Systems Conference (ICSSC-2010) – 27-30 Sep**  
*Anaheim Convention Center, Anaheim, CA*  
[aiaa.org/content.cfm?pageid=230&lumeetingid=2387](http://aiaa.org/content.cfm?pageid=230&lumeetingid=2387)
- **International Astronautical Congress 2010 – 27 Sep - 1 Oct**  
*Prague, Czech Republic*  
[iac2010.cz/en/registration](http://iac2010.cz/en/registration)
- **APSCC 2010 Satellite Conference & Exhibition – 5-7 Oct**  
*Tokyo, Japan*  
[apsc.or.kr/](http://apsc.or.kr/)
- **SATCON 2010 – 13-14 Oct**  
*Javits Convention Center, New York City*  
[satconexpo.com](http://satconexpo.com)

## NATIONAL SECURITY

### CANCELING RETURN TO THE MOON WILL RAISE SATELLITE LAUNCH COST

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*Keith Stein, DC Space News Examiner [examiner.com](http://examiner.com)  
10 March 2010*

Canceling NASA's return to the moon program will likely raise the cost of launching satellites into space, Air Force officials told a congressional committee on Wednesday.

"Launch costs are still rising," said Gary Payton, Deputy Under Secretary of the Air Force for Space Programs. Payton supports the Secretary of the Air Force with his responsibilities as the Service Acquisition Executive for Space Programs.

"Factors contributing to rising launch costs are the depletion of inventory purchased in prior years, reduced number of annual buys increasing unit costs, and a deteriorating subcontractor business base without commercial customers," Payton told the Senate Subcommittee on Strategic Forces.

President Barack Obama proposes to cancel NASA's Constellation Program, a program designed to continue launching Americans into low Earth orbit and later to the Moon and other destinations after the Space Shuttle is retired from service. In place of Constellation, the president's request focuses on supporting the development of commercial capabilities to deliver crews to the International Space Station and develop advanced technologies, among other proposed activities.

"The decision to replace NASA's Constellation program with a new, more technology-focused approach to space exploration, will likely reduce the customer base for solid rocket motors and potentially increase demand for liquid engines and strengthen the liquid-fuel rocket industrial base," Payton said. "We have initiated several efforts to examine the severity of these business base issues and identify potential mitigation steps."

### USAF WARNS OF INCREASED SATELLITE LAUNCH COSTS

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*Ben Iannotta [defensenews.com](http://defensenews.com)  
15 March 2010*

A top U.S. Air Force official had a simple answer when a senator asked him if the Obama administration had asked the Air Force to examine the effects of its plan to cancel NASA's Constellation rocket program.

"No, sir," said Gary Payton, deputy undersecretary of the Air Force for space programs, in answering Sen. David Vitter, R-La., during a March 10 Senate hearing.

The Air Force and the U.S. National Reconnaissance Office are now scrambling to learn how the February cancellation of Ares 1, a proposed successor to the space shuttle, could affect the costs of launching satellites. The military and intelligence community rely on the same manufacturers as NASA to build the rockets that launch their satellites, but the White House plans to turn to commercially owned rockets to launch astronauts following retirement of the shuttle. Lawmakers, including Vitter, are fighting back.

Payton said early information shows the price of rocket propulsion systems "might double" as a result of the Constellation cancellation. Six studies are under way together with NASA and NRO to examine price questions, work-force issues and reliability concerns, he said.

Constituents in Vitter's home state were counting on the Constellation program to bring new jobs to NASA's Michoud Assembly Facility, where NASA and Lockheed Martin build components of the soon-to-be retired space shuttle.

Vitter asked Payton, "Was the Air Force explicitly asked the impact on you of canceling Constellation before the decision was made?" "No, sir," Payton replied.

Yet the Constellation decision could not have come as a complete surprise to the Air Force. Air Force Gen. Robert Kehler, the commander of Air Force Space Command, pointed out that his service had submitted two columns of information — one for possible "opportunities" and one with possible "challenges" — at the request of a panel assembled by the White House last year to examine options for NASA's post shuttle future.

Kehler said he does not yet know how the cancellation would affect the Air Force.

"We don't have answers yet. What we do have is a potential concern," he said.

Kehler said some aspects of the proposal, such as research and development on a new engine and improvements to the "launch infrastructure" in Florida, could be good for the Air Force.

## **USAF TO LAUNCH 4 'FIRST-OF' SATS IN 2010**

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*William Matthews* [defensenews.com](http://defensenews.com)

*11 Mar 2010*

After years of production delays aggravated by cost overruns and punctuated by capabilities cuts, military satellite programs appear poised for a few positives this year.

Four "first of" satellites are scheduled to be launched in 2010, said Gary Payton, deputy undersecretary of the Air Force for space programs:

- The first Advanced Extremely High Frequency (AEHF) communications satellite.
- The first Space Based Space Surveillance (SBSS) satellite.
- The first new-generation Global Positioning System (GPS) satellite.
- And the first Operationally Responsive Space (ORS) satellite.

"It appears that space programs have finally turned the corner," said Sen. Ben Nelson, chairman of the Senate Armed Services strategic forces subcommittee.

Well, that's one way to look at it. But the Government Accountability Office has a different perspective.

The four launches planned for this year come only after years of enormous cost increases, delivery delays, design problems and oversight and management weaknesses, the GAO reported to Nelson's subcommittee March 10.

AEHF, for example, is five years behind schedule now, the GAO says. An AEHF satellite is scheduled to be launched in September. A \$5.6 billion program when it began in 2001, AEHF now will cost about twice that much and yield one less satellite, the GAO reported.

The new global positioning system satellite, GPS IIF, is 3½ years late and will cost \$1.7 billion instead of the \$730 million agreed upon when work on it began a decade ago, the GAO said.

SBSS has morphed from an \$885 million program to a \$3 billion behemoth that is three years late and one satellite short.

ORS 1, the first in a class of operationally responsive satellites that are supposed to be ready to pop promptly into space to meet current military needs, is taking 24 months to build and launch.

And those are just the four satellites the Air Force is touting as 2010 successes.

There is also the Space-Based Infrared System (SBIRS), a group of four infrared satellites designed to warn of missile launches and perform other reconnaissance operations. This 1996 program has ballooned from about \$ 2 billion to more than \$13.6 billion today. A Lockheed Martin-Northrop Grumman effort, SBIRS is eight years late. Two satellites have been launched so far, but hardware defects have since been discovered on the first one, the GAO said.

And there's MUOS, the Navy's mobile user objective system, an array of five communications satellites that are intended to supply the U.S. military with cell phone-like communications capabilities around the world.

MUOS is now 21 months late, creating the possibility for communications degradation after next January, the GAO said. MUOS costs, though, have fallen slightly. They remain in the \$1 billion neighborhood.

It took relatively rare action by the Defense Department to get to this relatively improved state in its satellite programs: The department killed programs that were performing even worse, said Cristina Chaplain, GAO's director of acquisition and sourcing management.

A year ago, Defense Secretary Robert Gates pulled the plug on TSAT, the transformational communications satellite. Air Force officials said the program's \$26 billion price tag and technical complexity was led to its downfall. That the 6-year-old program was already four years late didn't help.

That and other cancellations "alleviated competition for funding and may have allowed the Defense Department to focus on fixing problems and implementing reforms rather than taking on new, complex and potentially higher-risk efforts," Chaplain said.

Improvements to the satellite programs have not solved all of the military's woes with space.

An emerging problem is rising launch costs. The coming retirement of U.S. space shuttles this year and the proposed cancellation of Constellation program, the shuttles' follow-on, seem certain to push launch costs up, said Sen. David Vitter, R-La.

With NASA cutting back as a buyer of solid rocket motors and other propulsion systems, the cost of those systems could double, Payton said.

Other factors are also pushing launch costs up. The supply of rockets already in inventory is being depleted, meaning that new ones will have to be bought. But fewer annual buys are pushing costs up, Payton said.

There are fewer commercial customers, which is causing the subcontractor business base to deteriorate, and that is pushing costs up.

On the other hand, President Barack Obama's proposal in the 2011 budget to rely more on commercial vendors to launch satellites and eventually astronauts into space, could spark new research and development into liquid fuel engines, said Gen. Robert Kehler, chief of the Air Force Space Command. That could be "a good opportunity" for the Air Force, he said.

## **DELAYS IN SATELLITE PROGRAMS PUSH NAVY TO LOOK ELSEWHERE**

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*Bob Brewin [nextgov.com](http://nextgov.com)*

*11 March 2010*

Development and launch delays in the next generation of satellites that ground forces and naval ships use for communications have forced the Navy to consider leasing time on Australian military and experimental satellites, top service officials told lawmakers on Wednesday.

The majority of Defense Department satellite programs "have experienced problems during the past two decades that have driven up costs by hundreds of millions and even billions of dollars, and stretched schedules by years and increased technical risks," Cristina Chaplain, director of acquisition and sourcing management at the Government Accountability Office, told a hearing of the Strategic Forces subcommittee.

The Navy, for example, awarded Lockheed Martin Corp. a contract to develop an ultra-high frequency satellite system called the [Mobile User Objective System](#). The first of four satellites originally was scheduled to go into operation this month. But now it will not go live until December 2011, because of technical challenges, inadequate funding and an overly optimistic schedule, Chaplain said.

The mobile user program will replace an aging constellation of eight satellites in the UHF Follow-On System, which first went into operation in 1993. Chaplain said some of those satellites, which communicate with small shipboard terminals and mobile systems that ground forces use called manpacked terminals, will start to degrade in January 2011, nearly a year before the first mobile user satellite begins operation.

In a joint [statement](#), Vice Adm. David Dorsett, deputy chief of naval operations for information dominance and director of naval intelligence, and Gary Federici, deputy assistant secretary of the Navy for command, control, communications, computers, intelligence and space, said the service has started to plug coverage gaps by leasing capacity on a satellite operated by Intelsat and the Skynet 5 satellite operated by Paradigm Secure Communications for the British Ministry of Defence.

Dorsett and Federici told the hearing the Navy also plans to ensure continued service by signing a memorandum of understanding with the Australian Ministry of Defence for capacity on a UHF payload dedicated to serve military users on another Intelsat satellite slated for launch in early 2012.

If needed, the Navy will lease an additional channel on the Sicral satellite system operated by the Italian Ministry of Defense, Dorsett and Federici said.

The service also is considering using 10 UHF channels on the experimental [TacSat-4 satellite](#) developed by the Office of Naval Research and scheduled for launch later this year.

## **\$6.5 BILLION REQUEST FOR SATELLITE**

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*Tony Cappaccio, Bloomberg News [businessweek.com](http://businessweek.com)  
17 March 2010*

The Air Force said it will request four years of funds totaling \$6.5 billion for a Lockheed Martin Corp. military communications program that plans to launch its first satellite in September after six years of delays.

The funding request for fiscal years 2012-2015 will follow \$598 million sought for fiscal 2011, according to an e-mail from Gary Payton, the Air Force's top civilian for space programs. The six-satellite program is budgeted at a total of \$9.9 billion.

The request, part of the Pentagon's current five-year budget plan, reflects the Air Force moving forward with a program endorsed by Defense Secretary Robert Gates now that delays and technical problems have been worked out.

Bethesda, Maryland-based Lockheed Martin and its top subcontractor, Los Angeles-based Northrop Grumman Corp., have been awarded contracts to build the first three satellites. They may get contracts for a fourth that the Air Force budgeted for next year and two more planned by 2014. The Air Force budget figures show that the service may buy a seventh satellite starting in fiscal 2015.

The Advanced EHF program calls for six satellites, capable of withstanding shocks from a nuclear attack, to allow secure communications between top commanders including the president. It also would



provide transmission of tactical communications such as real-time video, battlefield maps and targeting data.

### Six-Year Delay

The Air Force plans to request \$1.6 billion for the program in fiscal 2012, peaking at \$1.9 billion in fiscal 2014, according to the data.

Last week, congressional investigators told a Senate Armed Services Committee panel the program appears to have overcome technical problems that increased costs and delayed the first launch by six years. The Air Force plans to launch its first satellite in September, said Cristina Chaplain, a director for the U.S. Government Accountability Office.

The satellite program, when it begins operating in 2013, will have twice as many data links as the current Milstar system and be able to transmit data five times faster, according to Lockheed.

"We continue to progress steadily through final integration and test activities on the first three satellites," Lockheed Space Systems spokesman Steve Tatum said in an e-mail. "This reflects the Air Force's strong commitment to providing superior protected satellite communications capabilities for the war fighter."

## **NEXT-GEN TACTICAL RADIOS GARNER NSA APPROVAL**

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*Amber Corrin [defensesystems.com](http://defensesystems.com)*

*18 March 2010*

The long-awaited National Security Agency certification for a next-generation military radio communications system was granted on March 9, according to the Joint Program Executive Office for the Joint Tactical Radio System. The certification marks a crucial step for the program, designed to upgrade radio communications for airborne service members.

The Multifunctional Information Distribution System Joint Tactical Radio System (MIDS JTRS) is the first of a series of JTRS products to be certified at this level by the NSA.

## **GSA'S SATELLITE SERVICES CONTRACT TARGETS BANDWIDTH COSTS**

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*Bob Brewin [nextgov.com](http://nextgov.com)*

*18 February 2010*

The General Services Administration and the Defense Information Systems Agency kicked off a multibillion-dollar government wide procurement on Wednesday to buy commercial satellite communications services to provide everything from connectivity for forces in Afghanistan to distance learning systems in the United States.

Under an agreement the two agencies signed in August 2009, GSA would purchase satellite services for the Defense Department and civilian agencies. The \$5 billion, 10-year [procurement](#), GSA said in a notice posted on the FedBizOps Web site on Feb. 9, marks a "key milestone in creating a common marketplace for commercial satellite communications services."

Kevin Gallo, GSA program manager for the \$5 billion [Future Commercial Satcom Acquisitions](#), said vendors now can submit proposals to provide military or civilian agencies the option to lease satellite bandwidth or transponders.

He said GSA also asked industry to submit proposals for fixed or mobile satellite subscription services that charge by the minute, megabyte or month. These services also could include end user equipment and network engineering services.

The Schedule 70 contracts can have a term limit of 20 years, and vendors can submit a proposal any time during that time frame. If awarded a contract, vendors will compete for federal satellite services on a task order basis, Gallo said.

Next month, GSA plans to release a request for information for an indefinite delivery-indefinite quantity satellite procurement to provide end-to-end satellite services, which will include both satellite capacity and terminals.

The new satellite contracts and the end-to-end procurement will replace DISA's [Defense Information Systems Network Satellite Transmission Service-Global](#) contract, which reported \$360 million in sales in fiscal 2009, and DISA's Inmarsat Airtime and Equipment, which had \$88 million in business in fiscal 2009. Both contracts expire in 2012, according to Gallo.

The new contracts also will replace GSA's [Satcom II contract](#), which reported sales of \$48 million in fiscal 2009 and expires next year.

Sales on the three contracts in fiscal 2009 totaled \$496 million, which Gallo said indicates the value of the combined GSA and DISA contracts will total at least \$5 billion during the next decade.

Combining all federal commercial satellite communications contracts should result in lower prices and administration costs, but Gallo declined to speculate on how much the government would save.

In August 2009, Bruce Bennett, DISA's director of satellite communications, said he expected savings of 10 percent to 15 percent on the acquisition of satellite bandwidth through the combined procurement program.

## CEO DISMISSES CARTEL CLAIM

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*Peter B. de Selding* [spacenews.com](http://spacenews.com)

*19 March 2010*

Intelsat Chief Executive David McGlade sought to defend his company against allegations that it had established a cartel with fellow satellite-fleet operators Sky Perfect JSat Corp. of Japan, SES of Luxembourg and Paradigm Secure Communications of Britain to lock up a U.S. Navy satellite-services contract potentially worth over \$500 million.

The award of the Commercial Broadband Satellite Program (CBSP) contract to Intelsat General, whose team included the other operators, is now under protest by several of the losing bidders. The other competitors for the contract included Artel Inc. of Reston, Va.; CapRock Communications of Fairfax, Va.; Globecom Systems of Hauppauge, N.Y.; and Segovia Inc. of Herndon, Va., which is now owned by mobile satellite services provider Inmarsat of London.

The indefinite-delivery, indefinite-quantity contract, valued at up to \$542.7 million over five years, is to provide the U.S. Navy with broadband links in the C-, Ku- and X-band portions of the radio spectrum.

The competition featured Intelsat and the other satellite-fleet operators proposing their own satellite capacity as part of the Intelsat General bid, while offering the same capacity to the other bidders.

The U.S. Defense Department has long used intermediaries to purchase satellite capacity but is moving toward accepting direct bids from satellite owners, a policy shift that would place in jeopardy the business models of the intermediary companies, often referred to as "integrators."

In a March 15 interview, McGlade dismissed the protests as a rear-guard action by companies seeking to maintain a role that their principal customer no longer needs. He specifically said Intelsat created firewalls to insulate the Intelsat General CBSP bid from Intelsat's other sales teams, who were free to offer Intelsat satellite capacity to the competing bidders.



“We treat this kind of thing very seriously, and we have a long record of being able to separate bids inside the organization so that one doesn’t benefit more than another,” McGlade said. “In this case, our team put a coalition together and delivered value to the Navy. You’re measured on a whole lot of criteria, it’s not just raw transponder capacity. The world is changing, and if you don’t add value you won’t be around for long.”

CapRock Communications Chief Executive Peter Shaper, during a panel discussion at the Satellite 2010 conference here, said CapRock has doubts about how its bid was judged against Intelsat General’s.

“We get limited information” about the competing bids, Shaper said March 15. But the information CapRock did receive suggests that the evaluation process was marred by “inconsistencies and irregularities. We want more information on how the decision was made,” Shaper said. He added that, for CapRock, the Intelsat General bid featured “anti-competitive practices.”

Much of the CBSP capacity will be used by the Navy to replace lower-speed L-band satellite links provided by Inmarsat.

Inmarsat Chief Executive Andrew Sukawaty, whose recently purchased Segovia Inc. unit is among the protesting companies, said March 17 at the conference that the Intelsat CBSP team members are “unnatural bedfellows that had to be put together for this bid.” Sukawaty said the CBSP program is unlikely to have a net long-term negative financial consequence for Inmarsat.

“Our yield on a per-minute basis from the U.S. Navy has gotten lower and lower and doesn’t bring us that much revenue,” Sukawaty said. “It’s clear that none of them [the Intelsat General team members] can provide on their own the corridors of coverage that the Navy wants.”

Inmarsat’s purchase of Segovia came after the CBSP bids were submitted but before the winner was announced and before the protests were lodged.

Inmarsat formally has no opinion on the validity of the protests and is not pushing Segovia one way or another, in keeping with the terms of the acquisition, Inmarsat Chief Financial Officer Rick Medlock said March 15.

Medlock said the Segovia purchase, for \$110 million in cash, is a so-called earn-out agreement under which Inmarsat pays a fixed price at the acquisition’s close and then an additional sum based on the company’s performance over a set period. In Segovia’s case, the earn-out period is three years, during which Inmarsat has little control over how Segovia manages its business.

Medlock said Segovia increased its revenue from nearly \$60 million in 2008 to around \$80 million in 2009 and is expected to grow by 15 percent annually over the next couple of years. “It’s their decision” to protest the CBSP award, Medlock said.

McGlade said that in Intelsat General’s CBSP bid, the three fixed satellite services providers are expected to divide about equally the C- and Ku-band services to the Navy. But because the contract is an indefinite-delivery, indefinite-quantity arrangement, it is difficult to determine how much of each fleet operator’s capacity the Navy will want, and when. Paradigm, which owns and operates Britain’s Skynet military communications satellites and has the right to commercialize the capacity, will have exclusive charge of the X-band portion of the contract.

Two industry officials said it is not certain the Navy will be able to exercise the contract’s full value given the pressures on its budget. “They do not have the full authorization for \$542 million yet,” said one official.

## AIR FORCE SCALES BACK MISSILE WARNING TECHNOLOGY PROGRAM

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Turner Brinton [spacenews.com](http://spacenews.com)

5 February 2010

The trend over the last several years of annual funding increases for U.S. Air Force space activity appears to be at an end, and that, coupled with the ongoing recapitalization of the service's operational satellite fleets, means there is little money left for new development initiatives.

The service's 2011 budget request, submitted to Congress Feb. 1, scales back the Third Generation Infrared Surveillance (TGIRS) program and curbs funding for the Operationally Responsive Space Office. This follows U.S. President Barack Obama's decision early last year to cancel the \$26 billion Transformational Satellite communications system.

Overall, the request includes \$8 billion for procurement and research and development for space programs, an 8 percent decrease from 2010, budget documents show. The total Air Force budget request for 2011 is \$170.8 billion, up 3 percent from this year's budget.

"The space budget is dominated by [research and development] and procurement," Gary Payton, deputy undersecretary of the Air Force for space, said during a Feb. 4 media event here. "Everybody's budget for procurement and [research and development] is going down a little bit, especially compared to 2008, 2009 and 2010, and space is part of that. It shows up more in the space budget because we have such a small part that is [operations and maintenance]."

TGIRS, originally called the Alternative Infrared Satellite System, was conceived as a potential alternative to the long-troubled Space Based Infrared System (SBIRS) and featured sensor development efforts by Raytheon Space and Airborne Systems of El Segundo, Calif., and SAIC of McLean, Va. SBIRS is nearly a decade behind schedule, but the first dedicated satellite recently completed thermal vacuum testing and is on track for an early 2011 launch.

Two years ago, the Air Force designated TGIRS as a technology development effort but continued work on the sensors. The service subsequently contracted to have the SAIC sensor launched as a hosted payload aboard a commercial communications satellite, and more recently tapped Raytheon to flight qualify its sensor.

Raytheon's work has now been canceled, but the effort to fly the SAIC sensor on a spacecraft owned by SES Americom will continue, Marilyn Thomas, the Air Force's budget deputy, said during a Feb. 1 media briefing. That portion of TGIRS will be funded out of the SBIRS budget, she said.

Meanwhile, the Pentagon's Operationally Responsive Space Office would receive \$94 million next year, \$30.3 million less than was appropriated for this year. The office's biggest project, an intelligence, surveillance and reconnaissance satellite called ORS-1, is still on track for a late-2010 launch and will not be affected. However, the office's investments in so-called enabler technologies for building and launching satellites on short notice would be slowed, Payton said.

With the space environment becoming ever more congested and potentially contested, the Air Force last year began investing more heavily in space situational awareness, which refers to the ability to know where things are in space and what they are doing. The Air Force is requesting \$426.5 million for space situational awareness programs in 2011, a \$188.1 million increase over this year. Two programs would receive the bulk of that funding: upgrades to a network of ground-based radars known as the Space Fence, and a follow-on to the Space Based Space Surveillance satellite, which is slated to launch in June.

Congress trimmed by about a third the Air Force's \$90 million request for Space Fence upgrades in 2010, which has added some uncertainty to the program, Payton said. Lockheed Martin, Northrop

Grumman and Raytheon are studying the upgrades under risk-reduction contracts, and a prime contractor is expected to be chosen this summer, Air Force budget documents show. The service will also choose a contractor for the next Space Based Space Surveillance satellite this year.

The big-ticket items in the Air Force's 2011 budget request are for operational programs already under contract. The service would purchase a fourth SBIRS satellite and long-lead parts for the fifth from prime contractor Lockheed Martin Space Systems of Sunnyvale, Calif., budget documents show. It would also continue development of the GPS 3 satellite navigation system, also by Lockheed Martin.

The budget includes funds for a seventh satellite in its Wideband Global SATCOM constellation as well as long-lead parts for the eighth satellite from prime contractor Boeing Space and Intelligence Systems of Seal Beach, Calif. The Air Force, using Navy funds, also would purchase a fifth Mobile User Objective System narrowband communications satellite from Lockheed Martin.

## **SECOND MISSILE WARNING SATELLITE ACHIEVES KEY TESTING MILESTONE**

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[lockheedmartin.com](http://lockheedmartin.com)

16 February 2010

Lockheed Martin announced today that it has achieved a key integrated test milestone on the second Space-Based Infrared System (SBIRS) geosynchronous orbit (GEO-2) spacecraft at its facilities in Sunnyvale, Calif.

SBIRS is designed to provide early warning of missile launches, and simultaneously support other missions including missile defense, technical intelligence and battlespace characterization.

The GEO-2 satellite, designed to provide new missile detection and surveillance capabilities for the nation, has completed its first phase of Baseline Integrated System Test (BIST-1), an extensive functional test that characterizes the overall performance of the satellite and establishes a performance baseline for the remainder of the test program.

With the completion of BIST-1, the team will proceed with final factory work on the satellite and prepare for the final, comprehensive BIST milestone prior to entering environmental testing. The spacecraft is planned for launch aboard an Atlas V launch vehicle in 2012.

"Concluding the first phase of BIST is another example of the entire government/industry team's commitment to operational excellence and successful execution of this critical national security program," said Dave Sheridan, Lockheed Martin's SBIRS GEO program manager. "We look forward to our continued positive momentum on SBIRS and achieving mission success for our customer."

The first SBIRS spacecraft (GEO-1) completed thermal vacuum testing and is now preparing for final integration and test activities that will culminate with final checkout and delivery to the Air Force later this year.

The SBIRS team is led by the Space Based Infrared Systems Wing at the U.S. Air Force Space and Missile Systems Center, Los Angeles Air Force Base, Calif. Lockheed Martin Space Systems Company, Sunnyvale, Calif., is the SBIRS prime contractor, with Northrop Grumman Electronic Systems, Azusa, Calif., as the payload integrator. Air Force Space Command operates the SBIRS system.

## **LOW-COST IMAGERY SATELLITE FOR ARMY**

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Turner Brinton [spacenews.com](http://spacenews.com)

12 March 2010

Spacecraft engineering firm Microcosm Inc. for the past year has been designing an imaging satellite for the U.S. Army that it says could eventually be bulk bought for about \$1 million a copy.

An executive with the Hawthorne, Calif.-based company said Microcosm engineers recently came up with an idea for a new small-satellite launch vehicle they hope the Air Force will help develop.

The Army Space and Missile Defense Command in April 2009 awarded Microcosm a \$70,000 contract to do initial design work on a satellite called NanoEye, Richard Van Allen, vice president of the company's space systems division, said March 9 at the Responsive Space Conference here. Last month, the company was awarded a \$50,000 follow-on contract that will culminate with a preliminary design review. Microcosm estimates it would need an additional \$1 million and 18 months to build and test the demonstration satellite, Van Allen said.

NanoEye was conceived to provide rapid access to imagery over a specific location and launch within hours of call-up. It would use a telescope with a 0.25-meter aperture built by ITT Corp. of Rochester, N.Y., and be flown in a very low orbit for a duration of six months to a year, Van Allen said. The optimal altitude for NanoEye is 200 kilometers to 300 kilometers, where it could produce imagery with ground resolution of 0.5 meters to 0.7 meters. Microcosm is designing the satellite to be capable of flying as low as 160 kilometers, an altitude near the threshold for maintaining orbit.

The company has conceived several variants of the satellite, ranging from a basic electro-optical version that could be bought in blocks of 10 satellites for about \$900,000 a piece, to an advanced electro-optical and infrared version that would cost about \$1.4 million each in blocks of 10.

The low prices envisioned for the satellites are enabled by standardized Cubesat technologies, a low-cost payload, and the willingness of the Army to allow "a new way of doing business," Van Allen said.

Though there are several launch options for NanoEye today, none provides a great combination of low price and short call-up to launch, Van Allen said. For that reason, Microcosm has conceived of a new 100-kilogram-class, liquid fueled rocket that could launch within 24 hours of call-up.

The company for the last 16 years has been working in fits and starts on its Scorpius family of small- and medium-class launch vehicles, Thomas Bauer, the company's director of systems engineering, said March 10. The Air Force had been funding the project, and two suborbital flight tests were conducted several years ago, but funding has since dried up, he said.

The company unveiled at the conference its smallest rocket concept yet, the Scorpius Mini-Sprite, a three-stage, liquid oxygen-kerosene fueled rocket.

Microcosm believes the rockets could cost as little as \$3 million each if the Air Force would pay for the development costs. The company estimates it needs about \$15 million and 20 months to develop and validate the Scorpius Mini-Sprite.

Small satellites are accounting for a greater proportion of the total number of satellites launched each year, but there is no affordable option for launching the smallest of these satellites, Bauer said. The Space Experiments Review Board, which is the military's mechanism for selecting small demonstration satellites for launch, has 59 approved missions. The Scorpius Mini-Sprite would be capable of launching 36 of these satellites, Bauer said.

"There is an underserved small satellite market, and it's very difficult to get a single small satellite to orbit," Bauer said. "We believe most of the market could be served by Scorpius."

## **SAR SAT GETS NOD FROM NGA**

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[satnews.com](http://satnews.com)

4 February 2010

EADS North America has received a five-year contract to provide commercial radar satellite data to the U.S. government's National Geospatial-Intelligence Agency (NGA) for use in intelligence, military and homeland security applications. The data will be provided by the geo-information service provider,

Infoterra GmbH, an EADS Astrium subsidiary that holds the commercial exploitation rights for the German radar satellite TerraSAR-X.

This Indefinite Delivery Indefinite Quantity (IDIQ) contract has a value of up to \$85 million, and involves the supply of imagery from TerraSAR-X, an EADS Astrium-built synthetic aperture radar (SAR) satellite, along with related products and direct downlink services. The data will enable the NGA to provide other U.S. government and DoD agencies improved information acquisition capabilities — particularly in bad weather and low light conditions. The agreement follows an initial 18-month contract in which NGA evaluated data delivered by the commercial TerraSAR-X radar satellite, which has been in orbit since 2007 and fully operational since early 2008.

During the new five-year contract, TerraSAR-X will be complemented with another EADS Astrium-built SAR satellite, TanDEM-X, which is scheduled to be launched in 2010. Together they will create a unique twin-satellite formation that will collect data for a global digital elevation model. The SAR instruments on TerraSAR-X and TanDEM-X enable large-area coverage as well as extremely high resolution and geolocation accuracy — performance that is particularly well suited for reconnaissance and intelligence applications. Data and products supplied under this contract can be used in processing centers of U.S. Department of Defense agencies and the U.S. intelligence community, as well as down linked directly to ground receiving facilities. Satellite images, fused with other intelligence and geospatial information deliver actionable information to national decision makers and warfighters. NGA, as the Department of Defense's (DoD) sole procurer of commercial remote sensing (CRS) data, routinely procures commercial imagery from both domestic and foreign sources. NGA and its mission partners use commercial SAR data for intelligence, military and homeland security applications.

## CONGRESS DEBATES NEW SATELLITE PLAN

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*Matt Kelley [usatoday.com](http://usatoday.com)*

*12 March 2010*

The Obama administration plans to reorganize and more than double the annual budget for a troubled weather satellite program that is five years behind schedule and more than \$7 billion over its original cost estimate.

But the administration first must convince a skeptical Congress that its plan will be enough to fix the project. Lawmakers need to approve a White House request to increase the [NPOESS] program's yearly budget by more than \$678 million to \$1.1 billion in 2011.

Sen. Barbara Mikulski, D-Md., who chairs the subcommittee that oversees spending for the program, said at a recent hearing: "We wonder ... will what we are doing make a difference?"

The program's four satellites are meant to preserve the nation's weather forecasting abilities by replacing a set of aging satellites that will wear out by the end of the decade. The project has been plagued by management squabbles, technical glitches and cost overruns for years. The satellites' costs soared from an estimate of \$7 billion in 2002 to more than \$14 billion, and the launch of the first satellite has been pushed back from 2009 to 2014.

Government watchdogs and an independent panel of experts concluded last year that the program's biggest problem was its unwieldy management structure — which was shared among the Air Force, NASA and the National Oceanic and Atmospheric Administration (NOAA).

The Air Force and the civilian agencies had different priorities, the expert panel concluded in a report released last June. The panel said the military was focused on controlling costs and providing weather forecasting data, while the civilian agencies sought to enhance the satellites' sensors to make climate-change measurements. Without management changes, the independent panel concluded, the program had "an extraordinarily low probability of success."

"The way the program was structured, it wasn't going to work," a member of the blue-ribbon panel, retired Navy rear admiral Thomas Betterton, said in a telephone interview.

The Obama administration's plans call for splitting management of the project, with the Air Force taking over two satellites and a joint NASA-NOAA team controlling development of two other satellites. Congress will decide on the request for more money during the months-long process of approving the annual spending bills, which has just begun. The Government Accountability Office, Congress' non-partisan investigative arm, is studying the reorganization plans and will issue a report in May, GAO official David Powner said in an e-mail.

Commerce Secretary Gary Locke, whose department includes NOAA, called the plans "a divorce with joint custody" at a Senate subcommittee hearing last week on his department's 2011 budget request.

Sen. Richard Shelby of Alabama, the top Republican on the panel that oversees Commerce's budget, was unimpressed. "These changes are only cosmetic," he said, calling the program "a disaster."

Mikulski said at the hearing she wants the project to succeed but is worried it might still fail or become so costly it will "eat NOAA alive."

Locke said he is "hopeful and confident that this is the right management structure." Scrapping the program entirely was not an option, Locke said.

"If we did nothing, some of our existing satellites will soon lose their operational capability and even fall from the sky, so we would have a gap in weather and climate data with no replacement in sight," Locke said.

Berrien Moore III, a member of the expert panel, said the president's proposed budget increase should provide enough funding to meet the program's needs. The panel had suggested the program needed an additional \$1 billion or more to be successful.

Splitting oversight of the program also should end its problems with being management by committee, Moore said.

"I think that the new approach will let people focus on what their missions are," said Moore, the executive director of Climate Central, a non-profit clearinghouse for climate information.

## **NEW UNMANNED SPACECRAFT TO LAUNCH IN APRIL**

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*Staff Report [airforcetimes.com](http://airforcetimes.com)  
18 March 2010*

Next month, the Air Force will launch an unmanned spacecraft that can fly home and land on its own.

The X-37B Orbital Test Vehicle is an adaptation of NASA's old X-37 program that started in 1999.

The craft is nearly 30 feet long and almost 10 feet tall, with a 14-foot, 11-inch wingspan. It could be used for intelligence gathering or delivering small satellites. For now, the Air Force says, the program objectives are "space experimentation, risk reduction and ... development [of] reusable space vehicle technologies."

The Air Force Rapid Capabilities Office in Washington has taken the lead on the X-37B initiative. The initial launch, on an Atlas V rocket, is scheduled for April 19 at Cape Canaveral Air Force Station, Fla.



## THE OPERATIONALLY RESPONSIVE SPACE-1 BUS

*Staff Writers Excerpt from: spacedaily.com*  
19 February 2010

Alliant Techsystems marks a major milestone this week as it prepares to conduct final testing and ship[ment of] the Operational Responsive Space-1 (ORS-1) satellite bus, after building it in just 16 months. The bus will be shipped to Goodrich Corporation for integration of the payload in preparation for launch later this year.

ORS-1 is part of the United States Department of Defense's (DoD) ORS program that focuses on using small satellites and launch vehicles to provide innovative sensor technologies to the commanders in the battlefield, and doing so in shortened timeframes and in more affordable ways.

The ORS-1 program supports Intelligence, Surveillance and Reconnaissance (ISR) needs, by providing innovative sensor systems that range across multiple spectrums.

The satellite bus is based on the design ATK developed for the successful TacSat-3 satellite with the addition of a propulsion module. ATK built the bus at its Beltsville, MD facility. One of the goals of the program is to develop satellite buses with standard interfaces that allow for different sensors to be used for specific missions.

"Being able to build these satellites fast, and tailor them to the precise user needs, provides the commanders and the war fighter unprecedented capability," said Blake Larson, president of ATK Space Systems.

"As we continue to build and operate satellites and develop more plug and play technologies, we will revolutionize how this nation responds to a threat."

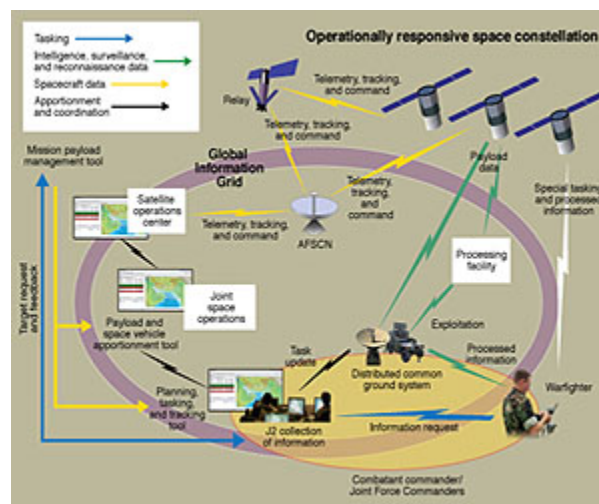
TacSat-3 was the earlier demonstration program that led to ORS-1. It was successfully launched last year and continues to perform well as an operational resource.

ATK is under contract to Goodrich, the overall spacecraft integrator of the ORS-1 satellite system. ORS-1 will provide color pictures of regions selected by ground force commanders, and use existing ground systems to process and distribute the images and other information out to the battlefield.

The system is designed to support urgent military needs, while establishing a foundation that will advance the multi-mission modular approach required for future ORS satellites.

The Operationally Responsive Space Office (ORS Office) is a joint initiative of several agencies within the DoD responsible for integrating joint ORS capabilities and for applying ORS resources to the development, acquisition and demonstration of capabilities to meet specific responsive space needs as established by global combatant command joint force commanders and users.

The ORS-1 Program is managed by the Space Development and Test Wing located at Kirtland Air Force base with support from the ORS Office.



*The operationally responsive space ground system enterprise for intelligence, surveillance, and reconnaissance. The constellation includes the functions of telemetry, tracking, and command, payload data, and special tasking and processed information. It is networked through the global information grid and AFSCN. - Click [here](#) for research paper and supporting charts and caption at Aerospace Corporation.*



## EMPLOYING SPACE IN COUNTER-INSURGENCY FIGHT

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*Senior Airman Dillon White, U.S. AFCENT Public Affairs [afspc.af.mil](mailto:afspc.af.mil)*

*12 February 2010*

More than 40 space warfighters from the U.S. and deployed locations in Iraq, Afghanistan and Southwest Asia attended the Theater Space Conference here, Feb. 8 to 10.

The space experts, from all services, collaborated to improve and maintain current space capabilities, such as global positioning, satellite communications, space control, and command and control systems.

Early in the conference, U.S. Air Force Maj. Gen. Stephen Hoog, Combined Force Air Component deputy commander, challenged space operators to take operational integration to a new level of effectiveness. He also spoke of the need to integrate all facets of combat power - air, ground, space and cyber.

"Space forces, just like air and ground forces, are adapting their capabilities, effects and operations to the current conflict, rather than trying to fit the conflict to their way of doing business," he said.

Following General Hoog's remarks, attendees from each regional command in Afghanistan and Iraq shared the successes, challenges and issues they currently face in U.S. Central Command's efforts to support air and ground commanders.

Space experts also put their information and combined experiences to work.

"This is not just a conference where people come and listen passively," said U.S. Air Force Col. David Thompson, U.S. Air Forces Central director of space forces. "We break people up into work groups, assign them specific tasks and say, 'Okay, your job is to find a solution to this problem and report back on your work.'"

U.S. Army Maj. Tod Fenner, Army Space Support Team leader, said topics covered during the three-day conference will help him better support Coalition forces at Kandahar Air Field, Afghanistan.

"We discussed the unique challenges associated with working within a coalition environment," he said. "We covered how we can better share vital space information with Coalition forces, which can often be a challenge because of security classification guidelines."

This better understanding will allow Major Fenner to provide relevant information in a timely fashion without compromising security.

"We provide a 3-D visualization of the battle space to our Coalition partners," the Major said. "Space is all about completing that visual picture, whether it's the enemy, the terrain, the time or the target, the more complete the visualization we can provide for our Coalition forces, the more effective they can be."

The proof of the conference's effectiveness can be found in its track record -- actionable solutions and plans that Soldiers, Marines, Sailors and Airmen have produced here.

"During the conference in June, we addressed the drawdown in Iraq and buildup in Afghanistan," Colonel Thompson said. "We needed a plan to draw down space forces and space support in one place and build it up in another. We put together a team to create that plan, then implemented it. The space-force transition is now in the final stages of completion."

Integration of space capabilities between U.S. and Coalition forces, such as Afghanistan's International Security Assistance Force, also took root at a TSC. "Integration and synchronization of effects can only go so far through e-mails, phone calls and video teleconferences," said U.S. Army Lt. Col. Rich Lewis, USAFCENT deputy director of Space Forces. "Building an effective team that can deal with these complex challenges requires strong relationships. This conference also strives to build those relationships."

## CIVIL AND ACADEMIC

### OBAMA PLEDGES \$1.9B TO SPACE INDUSTRY

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*Orlando Business Journal* [bizjournals.com](http://bizjournals.com)

9 March 2010

President Obama is planning a return trip to Florida next month to present his administration's vision for America's future in space.

Obama will join space leaders to discuss NASA's new course as well as the future of U.S. leadership in space flight, The White House said. The conference will focus on the goals and strategies in this new vision, the next steps, the new technologies, new jobs and new industries it will create.

Obama's recent actions in killing some of NASA's high-profile projects have come under fire, but the president said he added \$6 billion for NASA in fiscal 2011 and the next five years. That funding, according to the president, would promote innovation at NASA on a more "dynamic, flexible and sustainable trajectory" designed to "propel us on a new journey of innovation and discovery."

The White House did not say where the conference would take place, but it likely would be held near Kennedy Space Center in Brevard County. As many as 9,000 KSC workers are expected to lose their jobs this year, after the space shuttle completes its final four missions.

Obama plans to unveil a new plan for NASA that would include an additional \$1.9 billion for Florida alone over the next five years. That would include a faster pace of rocket launches out of Florida as NASA tests new technologies, launches robotic precursor missions and resupplies the International Space Station.

The plan also will give a boost to a new commercial crew transportation industry that could create as many as 1,700 new jobs in Florida, White House officials said.

### ENDING CONSTELLATION WILL COST MORE

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*Frank Morring, Jr.* [aviationweek.com](http://aviationweek.com)

15 March 2010

The \$2.5 billion in NASA's Fiscal 2011 budget request to terminate the Constellation Program is probably "oversubscribed," and will not cover all of the expenses expected to grow from shutting down the shuttle-follow-on effort.

Elizabeth Robinson, the former Office of Management and Budget career official appointed by President Barack Obama as the space agency's chief financial officer, told the Robert H. Goddard Memorial Symposium here last week that the funds are not intended to cover contract termination liability — the cost to a contractor and NASA of shutting down contractor facilities, terminating leases and the like.

Instead, they will go for the cost to the government of pulling Constellation equipment out of its own facilities, environmental remediation at those facilities, and keeping civil servants on the payroll until new work can be found for them, Robinson said.

"The program termination costs and the civilian transition costs are the primary things in the \$2.5 billion," she said.

NASA has spent about \$9 billion on Constellation to date — largely to develop the Ares I crew launch vehicle and the Orion crew exploration vehicle just completing preliminary design review. The Fiscal 2011 budget includes \$1.9 billion in Fiscal 2011 and \$600 million in Fiscal 2012 for the program termination and civilian transition costs associated with stopping it.

Robinson said NASA is developing a plan for managing the requested funds and handling the additional contract termination liability. She conceded the \$2.5 billion has quickly become a potential cash cow within the agency as NASA struggles to change direction in human access to orbit from Constellation vehicles to a purely commercial approach.

"Everyone says that line will take care of it," she said. "I think it will be oversubscribed."

## **NASA NOW READY TO DETECT SOLAR "STORM OF THE CENTURY"**

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Jason Mick [dailytech.com](http://dailytech.com)

2 March 2010

The year was 1859 and in the U.S. the roots of Civil War were brewing. However, in outer space a far worse threat was stewing. Explosions on the surface of the sun ensued with far greater than usual fury and the Earth was swept with solar radiation from solar flares. Around the country telegraph lines exploded, causing fires, and crippled our nation's communication.

Fast forward to the present. The U.S. has not experienced such a storm in decades. In orbit are a host of vital, yet vulnerable, electronics (satellites) that provide everything from television to other critical communications. Around the globe, high energy transformers power the industrialized world's hunger for power. But a solar "storm of the century" -- like the one of 1859 -- could destroy all of that in a mere day, frying first satellites and then transformers via a bombardment of high energy electrons, ultimately plunging much of the world in darkness and leaving many without running water.

Last month NASA launched the Solar Dynamics Observatory, or SDO, from the Kennedy Space Center in Florida. The new satellite is packed with electronics that can measure details of the sun's atmosphere, its surface, and even its interior. It will surely yield stunning new insight into how our solar system's power plant works. However, pure research aside, its most crucial mission may be in detect super solar storms -- as NASA puts it, a "space Katrina".

Solar activity, a phenomena that typically follows a 11-year cycle, reached a record low in 2008 and 2009 with almost no sunspots being detected. Some researchers say that means that it may rebound to a peak of record activity when activity reaches a maximum again sometime between 2012 and 2015.

A solar storm occurs when activity on the sun -- huge explosions containing the force of scores of atom bombs -- send magnetically charged particles hurtling toward the Earth's magnetic field, our planet's built in protection against solar activity.

Such an event could cause hundreds of billions, if not trillions of dollars in damage. In 1989 a solar storm knocked out power to 6 million in Quebec, and in 2006 a storm knocked out GPS coverage for half of the globe. However, those storms might look garden-variety compared to what NASA says could come.

A solar storm could kill or injure astronauts in space at the time and travelers flying near the Earth's poles.

The SDO's greatest promise is that it's giving officials a means of detecting a dangerous solar event as it brews up, not as its happening. By the time it happens, its largely too late to prepare for it, but detecting it early could give time for preparations.

The satellite sits in geosynchronous orbit steadily viewing the sun, taking an image every 1.25 seconds, and sending a total of 1.5 TB of data back to Earth daily.

The satellite contains a wealth of high tech equipment designed by researchers at the University of Colorado in Boulder and Lockheed Martin in Palo Alto, California. Among its instruments are the Helioseismic and Magnetic Imager or HMI, which detect magnetic waves traveling through the sun that

could trigger solar eruptions; the Atmospheric Imaging Assembly or AIA, which studies the sun's corona and watches for changes; and the Extreme Ultraviolet Variability Experiment or EVE, which scans for incoming ultraviolet rays, which could impact satellites and hamper GPS communications.

The satellite wasn't cheap -- it went \$56M USD over budget, with a final estimated cost of \$856M USD for construction, launch, five years of operation, and six years of data analysis. With a scrubbed launch on February 10 (the launch occurred the next day), the cost might be even higher.

Still, that investment will likely be worth it as it grants the Earth an eye in space that will likely be able to watch for trouble for at least ten years. Describes Phil Chamberlin, the deputy project scientist for SDO, "You look at the sun and [in the past would] say, 'Whoops, we just saw a big flare, it's going to affect us.'"

Now we're prepared, though. If a "space Katrina" fires up, at least we'll be ready to brace for it this time.

## **TDRS REVIEW**

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[satnews.com](http://satnews.com)

*23 February 2010*

NASA [has] announced that the Tracking and Data Relay Satellite (TDRS) K-L program successfully completed its system-level Critical Design Review (CDR) and Production Readiness Review (PRR) in El Segundo on February 19. When TDRS satellites K and L join the operational TDRS constellation on orbit, they will provide voice, data and communications relay services to Earth-orbiting spacecraft, such as the International Space Station, several launch vehicles and the Hubble Space Telescope.

The CDR and PRR bridge the design and manufacturing stages of the TDRS program. The reviews validate that the TDRS K-L system design will meet NASA's requirements, is backed with solid analysis and documentation, and will operate effectively when the satellites launch in 2012 and 2013. Based upon this successful review, Boeing will begin assembly of the K and L satellites. Both reviews were presented to an independent board that evaluated the design aspects of TDRS K and L, including spacecraft assembly and systems integration, testing and safety requirements. TDRS K and L are the 11th and 12th satellites to be built for the TDRS system. Together with the Boeing-built TDRS 8, 9 and 10, which launched in 2000 and 2002, TDRS K and L will help to replenish the aging TDRS constellation, which was established in 1983 to replace NASA's worldwide network of ground tracking stations.

## **NASA – NO LISTENING PROBLEMS**

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[satnews.com](http://satnews.com)

*1 March 2010*

NASA officials broke ground near Canberra, Australia last Wednesday, starting a new antenna-building campaign to improve Deep Space Network communications. Following the recommendations of an independent study, NASA embarked on an ambitious project to replace its aging fleet of 70-meter-wide (230-foot-wide) dishes with a new generation of 34-meter (112-foot) antennas by 2025.

The three 70-meter antennas, located at the NASA Deep Space Network complexes at Goldstone, California, Madrid, Spain, and Canberra, are more than 40 years old and show wear and tear from constant use. The new antennas, known as "beam wave guide" antennas, can be used more flexibly, allowing the network to operate on several different frequency bands within the same antenna. Their electronic equipment is more accessible, making maintenance easier and less costly. The new antennas also can receive higher-frequency, Ka-band wider-bandwidth signals. This band, required for new NASA missions approved after 2009, allows the newer antennas to carry more data than the older ones.

In the first phase of the project near Canberra, NASA expects to complete the building of up to three 34-meter antennas by 2018. The decision to begin construction came on the 50th anniversary of U.S. and Australian cooperation in space tracking operations. Space Communications and Navigation is responsible for managing all NASA space communications and navigation resources and their operations. NASA's Jet Propulsion Laboratory in Pasadena, California, manages the agency's Deep Space Network, an important component of the agency's space communications resources. NASA's goal is to integrate all NASA communications resources into a unified, far more capable network. Australia's Commonwealth Scientific and Industrial Research Organization manages the communication complex near Canberra for NASA.

## **NOAA BUDGET REQUEST INCLUDES FUNDS TO END NPOESS CONTRACT**

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*Turner Brinton [spacenews.com](http://spacenews.com)*

*19 March 2010*

Northrop Grumman faces possible termination of its multibillion-dollar contract to build a next-generation weather satellite system for the U.S. government, and many of the company's key responsibilities on the newly revamped program are being handed over to NASA, according to a senior government official.

Jane Lubchenco, administrator of the U.S. National Oceanic and Atmospheric Administration (NOAA), told lawmakers March 17 that the government's 2011 budget request for civilian weather satellites includes termination fees for Northrop Grumman's contract, which was awarded in 2002. The program in question, dubbed the National Polar-orbiting Operational Environmental Satellite System (NPOESS), has been dramatically restructured following years of cost growth and delays, leaving Northrop Grumman's future role uncertain.

The restructuring, announced in early February with the rollout of U.S. President Barack Obama's budget request, effectively ended the NPOESS program, which was intended to merge the separate polar-orbiting weather satellites of NOAA and the U.S. Air Force. NOAA and the Air Force will now pursue separate systems, with the civilian program taking ownership of the assets that were developed as part of NPOESS.

As NPOESS prime contractor, Northrop Grumman Aerospace Systems of Los Angeles was to build the satellite platforms and also was responsible for overall integration of the system, including the instruments and ground segment. Testifying before the House Appropriations commerce, justice, science subcommittee, Lubchenco said NASA will take over the instrument and ground-segment integration duties for what is now called the Joint Polar Satellite System as part of a transition plan being finalized by NOAA and the U.S. Department of Defense. NOAA's budget request includes \$1.06 billion for the Joint Polar Satellite System in 2011.

"The federal budget includes contingency funding, termination costs for the Northrop Grumman contract, and a cost estimate that is at or close to the 80 percent level," Lubchenco said. "So this will ensure that lack of funding won't drive day-to-day decisions, which has been a giant problem with this program.

"What [the Defense Department] decides to do in the out years still has potential for affecting our costs. ... Termination liabilities are of particular concern for us. We're working with [the Defense Department] to minimize those liabilities, and we're still in the process of negotiations."

NOAA spokesman John Leslie said March 19 no final decision has been made to cancel Northrop Grumman's contract.



NOAA had previously announced that it would use a different satellite platform for the Joint Polar Satellite System, with a supplier to be selected at a later date. NASA's Goddard Space Flight Center, Greenbelt, Md., will manage the development of two spacecraft, planned for launch in 2015 and 2017, that will retain all of the instruments that were slated to fly on NPOESS, Lubchenco said.

The Defense Department still has two of its legacy Defense Meteorological Satellite Program spacecraft yet to launch and has not yet decided on its approach for acquiring weather satellite data in the latter part of this decade. The Air Force's budget request for 2011 includes nearly \$352 million for NPOESS.

"Northrop Grumman continues to work with NOAA, NASA and the [Defense Department and Air Force] on the transition activities related to the NPOESS program," Northrop Grumman spokesman Lon Rains said in an e-mailed statement. "As this transition proceeds, the Northrop Grumman team remains dedicated to fulfilling the contract of record. We continue to believe that the capacity that has been built up by our NPOESS team — the design work, the hardware, an active supply chain and the team itself — will be the fastest and most reliable way to provide civil and military users the capabilities they so critically need."

Northrop Grumman's NPOESS contract is with the Air Force.

At the hearing, Lubchenco also defended decisions related to other NOAA satellite programs in its 2011 budget request. NOAA uses GPS radio occultation data for operational weather forecasting that comes from a satellite system built in cooperation with Taiwan. In planning to acquire this type of data after that system ceases operations, NOAA considered purchasing the data commercially. It awarded study contracts last year to GeoOptics of Pasadena, Calif., and Iridium Communications of Bethesda, Md., to perform cost and feasibility studies on providing commercial GPS radio occultation data.

Instead, NOAA chose to request \$3.7 million to begin developing a follow-on constellation in cooperation with Taiwan. Lubchenco said agency officials determined that this would be the most economical way to obtain the data in the future, but she did not have a comparative cost analysis at hand. She said NOAA would provide the analysis to the committee.

Rep. Adam Schiff (D-Calif.) questioned NOAA's decision not to request funds to replace the QuikScat satellite, which stopped working late last year after providing ocean wind data for a decade. While the capability is important for weather forecasting, NOAA has other ways to monitor ocean winds along the coastlines, Lubchenco said. And though the agency no longer has the ability to monitor these conditions in the middle of the oceans, it has other ways of predicting hurricanes, making a QuikScat replacement a less urgent priority than other needs, she said.

## **DELTA IV ROCKET TAKES SATELLITE TO ORBIT**

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*Todd Halvorson [floridatoday.com](http://floridatoday.com)*

*5 March 2010*

A powerful Delta IV rocket hauled a national weather satellite into orbit Thursday after a spectacular nighttime launch from Cape Canaveral Air Force Station.

The 224-foot United Launch Alliance rocket blasted off from Launch Complex 37B at 6:57 p.m., 40 minutes later than planned.

Launch managers waited for strong upper-altitude winds to die down so the rocket would not be knocked off course or ripped apart in flight.

When the Delta IV finally took flight, it blazed a brilliant trail as it arced out over the Atlantic Ocean and sped toward space.

The \$500 million Geostationary Operational Environmental Satellite is safely circling the planet today after a successful deployment and joins two other GOES spacecraft on a mission to monitor rapidly changing atmospheric conditions that spawn hurricanes, tornadoes and floods.

The spacecraft produce the ubiquitous satellite images seen round the clock on television news shows. They play a critical role in providing advanced warnings before the arrival of severe storms.

"GOES is not just any satellite. It's much more than that," said Andre Dress, deputy project manager at NASA's Goddard Space Flight Center in Greenbelt, Md. "It's all about saving lives and property."

Added Bart Hagemeyer, meteorologist in charge of the National Weather Service office in Melbourne, "We couldn't do our job without them."

NASA procured and managed the design, development and launch of the three Boeing-built satellites, each of which are expected to operate 10 to 15 years in orbit.

The National Oceanic and Atmospheric Administration owns the GOES spacecraft and operate them after NASA performs initial tests in orbit. Total cost to U.S. taxpayers: \$2.35 billion



## INTERNATIONAL

### INTERNATIONAL SPACE STATION HEADS OF AGENCY

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*European Space Agency* [esa.int](http://esa.int)

*11 March 2010*

The heads of the International Space Station (ISS) agencies from Canada, Europe, Japan, Russia and the United States met in Tokyo, Japan, on 11 March 2010, to review ISS cooperation.

With the assembly of the ISS nearing completion and the capability to support a full-time crew of six established, they noted the outstanding opportunities now offered by the ISS for on-orbit research and for discovery including the operation and management of the world's largest international space complex.

In particular, they noted the unprecedented opportunities that enhanced use of this unique facility provides to drive advanced science and technology. This research will deliver benefits to humanity on Earth while preparing the way for future exploration activities beyond low-Earth orbit. The ISS will also allow the partnership to experiment with more integrated international operations and research, paving the way for enhanced collaboration on future international missions.

The Heads of Agency reaffirmed the importance of full exploitation of the Station's scientific, engineering, utilisation, and education potential. They noted that there are no identified technical constraints to continuing ISS operations beyond the current planning horizon of 2015 to at least 2020 and that the Partnership is currently working to certify on-orbit elements through 2028. The Heads of Agency expressed their strong mutual interest in continuing operations and utilisation for as long as the benefits of ISS exploitation are demonstrated. They acknowledged that a US fiscal year 2011 budget consistent with the US Administration's budget request would allow the United States to support the continuation of ISS operations and utilisation activities to at least 2020. They emphasised their common intent to undertake the necessary procedures within their respective governments to reach consensus later this year on the continuation of the ISS to the next decade.

In looking ahead, the Heads of Agency discussed the importance of increasing ISS utilisation and operational efficiency by all possible means, including finding and coordinating efficiencies across the ISS Programme and assuring the most effective use of essential capabilities, such as space transportation for crew and cargo, for the life of the programme.

### BOLIVIA CREATES SPACE AGENCY TO MANAGE SATELLITE PROGRAM

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*Staff Writers* [spacedaily.com](http://spacedaily.com)

*12 February 2010*

Bolivian President Evo Morales has signed a decree establishing a national space agency to oversee a satellite project scheduled to be completed by 2013, the Latin American Herald Tribune said.

The document, signed by the Bolivian president on Wednesday, stipulates that the Bolivian Space Agency "will promote technology transfer, human-resource development and the application of satellite-communications programs to education, defense, medicine and meteorology."

The new government body will also manage the implementation of the Tupac Katari satellite project, named after the leader of an Indian rebellion against the Spanish colony in the 18th century.

The agency will have an initial budget of \$1 million and will be financed through government funding, donations and foreign loans, the Latin American Herald Tribune said, citing the country's Public Works Minister Walter Delgadillo Terceros.

According to the Latin American Herald Tribune, technical experts from China and Bolivia met in January to assess Bolivia's telecommunications capabilities and to start preliminary work on the design of the Tupac Katari, which will be built on the basis of the Chinese DFH-4 satellite.

The first Bolivian satellite is expected to be put into orbit in 2013.

## EUROPE POISED TO REMOVE CHINESE PAYLOADS FROM GALILEO SATS

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*Peter B. de Selding* [spacenews.com](http://spacenews.com)

*12 March 2010*

The European Commission appears set to order the builders of the initial four Galileo navigation satellites, now in final assembly, to remove their Chinese-built search-and-rescue payloads as part of an evolving security and technology-independence policy, European government and industry officials said.

Similar motivations will prevent the builders of the full 30-satellite Galileo constellation from purchasing search-and-rescue terminals from Canada's Com Dev despite Canada's status as an associate member of the 18-nation European Space Agency and Com Dev's acknowledged expertise in the technology, officials said.

Galileo program managers, anticipating a commission ruling they say they still have not received, have begun designing replacement hardware that would have the same weight as the Chinese gear and would not further delay delivery of the four Galileo In-Orbit Validation spacecraft.

The four satellites are in final assembly and test by a manufacturing consortium led by Astrium Satellites and Thales Alenia Space. Their launch date has recently slipped to early 2011 for the first two, and mid-2011 for the remaining pair.

A European Union decision to offload the Chinese-built hardware could serve as a metaphor for the European Commission's relations with China in the Galileo program.

When Galileo was viewed as a private-sector development with public-sector financial participation, European Commission program managers sought Chinese participation in pursuit of Chinese cash in the short term and privileged access to China's market for positioning and timing applications in the longer term.

That business model collapsed, however, and Galileo was transformed into a 100 percent taxpayer-financed project. Galileo's managers also became aware of the security considerations implicit in the construction of a global positioning, navigation and timing satellite network.

China was, in effect, disinvited from Galileo, a decision that was reinforced by China's move to build its own global system, called Beidou/Compass.

At the Munich Satellite Navigation Summit here March 10, a Chinese government official bluntly asked the European Commission why it no longer wanted to work with China, and when China's cash investment in Galileo would be returned.

Paul Verhoef, the European Commission's satellite navigation program manager, sought to explain.

Europe's decision to invite China to invest in Galileo, Verhoef said, "was with a number of purposes in mind, and in a different context. Some nations [outside Europe] wanted to participate in the construction of the system as part of a public-private partnership. But Galileo subsequently was made into a public procurement with public-procurement rules."

Verhoef added: "China's ambitions also had changed. China originally said it was designing its own smaller, regional system for military use. Then China moved to a global civil system. It is one thing to

work together in one context. It is quite another in another context. But our two systems can still cooperate.”

The former Galileo partners are now embroiled in a dispute over the radio frequencies their separate navigation constellations will use for their encrypted, quasi-military service, which for Galileo is called the Public Regulated Service (PRS). Chinese officials refer to their PRS equivalent simply as the Authorized Service.

Satellite navigation system sponsors would like to be able to locate their government-only service on radio spectrum not used by any other navigation system. That way, they can jam all other navigation signals in a conflict zone or during an emergency while retaining the use of their own service.

“For the authorized service, spectral separation is beneficial,” said Jiao Wenhai of the China Satellite Navigation Office in Beijing during a March 10 presentation here. “But due to the limits of the spectrum, it is difficult to achieve.”

China has begun deploying its Beidou/Compass satellites. The full system is designed to include five geostationary-orbit satellites, three satellites in inclined geosynchronous orbit for northern coverage and 27 satellites operating in medium Earth orbit. An initial capacity to serve Asia is expected to be in place by 2012, with full system deployment by 2020, Jiao said.

In an interview, Jiao said that despite some two years of negotiations with Europe and the United States to find separate spectrum slices for the U.S. GPS military code, Europe’s PRS and the Chinese Authorized Service, no solution has been found because of the physical limits of available radio spectrum.

Europe and the United States agreed on the locations of their encrypted services in 2004. Verhoef said Europe and Russia — whose Glonass constellation is nearing full in-orbit operational status — are “well advanced” on the issue. “We’re still in discussions with China,” he said.

## **U.K. APPROVES FOURTH SKYNET 5 SPACECRAFT**

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*Michael A. Taverna, [aviationweek.com](http://aviationweek.com)*

*10 March 2010*

The U.K. Ministry of Defense has decided to acquire a fourth Skynet 5 spacecraft and to extend the contract for supply of services from the Skynet constellation by two additional years, to 2022. The 400 million pound (\$600 million) extension will bring the total value of the private financing initiative (PFI) to 3.6 billion pounds (\$5.4 billion).

Construction of long-lead items, including the payload, is already largely completed under a previous two-year extension agreed to in December 2005. This will enable the satellite, Skynet 5D, to be orbited in 2013. EADS Astrium is supplying the spacecraft and Astrium Services affiliate Paradigm is the service provider.

The defense ministry said the new extension was motivated by growing operational requirements in foreign theaters — including Afghanistan, Iraq and the Balkans — and heavy demand among allies. The Czech Republic, Slovenia and Norway recently agreed to sign on for Skynet 5 capacity, which is already used by Australia, Belgium, Canada, France, Germany, Netherlands, Portugal and the U.S., as well as NATO.

## FRANCO-ITALIAN ATHENA-FIDUS OFFERS WIDEBAND SATCOM

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[defenseindustrydaily.com/](http://defenseindustrydaily.com/)

*18 February 2010*

In February 2010, a EUR 280 million contract launched the Athena-Fidus (Access on Theatres for European allied forces Nations-French Italian Dual Use Satellite) satellite program. The program is similar to the concept behind the US/Australian WGS, aiming to complement hardened satellite systems with a non-hardened broadband system.

France's recent scramble to find the satellite bandwidth required to operate its Heron/Harfang UAVs in Afghanistan illustrates the project's immediate military relevance. Once operational, the Athena-Fidus system will be used by the French, Belgian and Italian armed forces, as well as the civil protection services of France and Italy.

Athena-Fidus is envisioned as a single geostationary satellite operating in the Ka and EHF bands, and its associated ground control segment. The satellite will complement the existing French Syracuse 3 and Italian SICRAL-1/1B hardened secure satellites, and the SICRAL-2 program. It will employ DVB-RCS and DBV-S2 high performance civil communications standards, to enhance transmission capacity and service availability; speeds are expected to be over 1 GB/second, and possibly as high as 3 GB/s.

Based on a Thales Alenia Space Spacebus 4000 B2 platform, the Athena-Fidus satellite will weigh over 3,000 kg/ 6,613 pounds at launch, with a design life exceeding 15 years. It will carry 2 payloads, one each for France and Italy.

The satellite should be launched in 2013 by Arianespace, and ground control will be managed by Telespazio. The contract will be managed by France's DGA, in conjunction with France's CNES, and Italy's ASI space agencies. Thales Alenia Space's partner Telespazio will operate the ground control stations, and Arianespace will launch the satellite.

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## FRANCE TO PAY RUSSIA ONE BILLION EURO FOR 14 SOYUZ CARRIER ROCKETS

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Staff Writers [space-travel.com](http://space-travel.com)

9 March 2010

France has put aside some \$1 billion to buy 14 Soyuz carrier rockets from Russia, French satellite launch firm Arianespace CEO Jean-Yves Le Gall said Tuesday.

"We have ordered 14 Soyuzes from the Russian Federation; the contract's cost is about \$1 billion. These are ambitious plans," Le Gall said at a Russian-French business forum, held as part of President Dmitry Medvedev's visit to France. His speech was broadcast by the Rossiya 24 TV channel.

The new deal marks another step in cooperation between Russia and France in the space sector. Arianespace signed a contract with Russia's space agency in 2008 for the launch of 10 Russian Soyuz-ST carrier rockets from the Kourou space center in French Guiana.

Le Gall confirmed earlier reports that the first launch is scheduled for 2010, saying it will take place in the second quarter.

The Russian and French space agencies Roscosmos and CNES on Monday approved a plan of joint work for 2010 as part of a cooperation program on new carrier rockets.

Medvedev's visit to France will end Wednesday. He has been accompanied by a delegation of 80 Russian business leaders, with officials predicting before the visit that around 10 major deals would be signed during the trip.

Russia's Gazprom and GDF Suez signed a memorandum Monday on the French utility taking a 9% stake in the Nord Stream gas pipeline project to pump Russian gas to Germany under the Baltic Sea.

Under the deal, the 20% shares of the two German partners, Wintershall Holding and E.ON Ruhrgas, will be reduced, but Gazprom's 51% stake and the 9% held by Dutch Gasunie will not be affected.

French President Nicolas Sarkozy said Monday after talks with Medvedev that Russia and France had started "exclusive talks" on the purchase of four French Mistral-class amphibious-assault ships.

He said two of the four Mistral-class ships under discussion could be built in Russia. The announcement of the talks confirmed earlier comments by a Russian Defense Ministry source that the sale would not be finalized during Medvedev's visit.

A Mistral-class ship is capable of transporting and deploying 16 helicopters, four landing barges, up to 70 vehicles including 13 battle tanks, and 450 soldiers. The vessel is equipped with a 69-bed hospital and can be used as an amphibious command ship.

## ITALIAN SPACE PLANE PROTOTYPE TO ATTEMPT DARING MANEUVERS

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Jeremy Hsu [space.com](http://space.com)

1 March 2010

Hypersonic space planes may someday fly into space from airport runways, but an Italian aerospace firm first wants to test whether such futuristic vehicles could still pull off high-speed maneuvers during the fiery re-entry into Earth's atmosphere.

The Italian Center for Aerospace Research (CIRA) in Capua, Italy has prepped a new unmanned prototype space plane called Pollux for a possible flight in March. Pollux would perform several test maneuvers while reaching a top re-entry speed of Mach 1.2.

"We want to fly while re-entering, and we want to reduce the logical gap between aeronautics and space," said Gennaro Russo, CIRA's Space Programs lead and USV (Unmanned Space Vehicles) program manager.

A less-advanced twin to Pollux, the engineless prototype space vehicle named Castor, successfully flew at transonic speeds between altitudes of about 10 and 6.2 miles (16 to 10 km), and reached a top speed of Mach 1.08, or just above the speed of sound.

Pollux is designed to reach its drop height of about 15 miles (24 km) courtesy of a stratospheric balloon. Upon release, the space vehicle is expected to carry out pre-programmed aeronautic maneuvers where it pulls its nose up, conducts an angle of attack maneuver, a two-bank turn maneuver, and then finish with another nose-up maneuver before opening its parachute at a height of just over 3 miles (5 km).

All those twists and turns would allow the 500 experimental sensors aboard Pollux to record the acceleration, aerodynamic pressures, and strain throughout. That information will go a long way toward helping researchers figure out what maneuvers a hypersonic vehicle could pull off as it comes in for landing from space, researchers said.

"Being able to handle the flight and not simply the drop along a re-entry trajectory, you will be able to select the landing spaceport regardless of the weather conditions during the re-entry," Russo told SPACE.com.

Like its twin Castor, Pollux is a 30-foot (9.1-meter) long flying test vehicle with a wingspan of 13 feet (4 meters), and a weight of 2,910 pounds (1,319 kg). But Pollux has more advanced control systems that allow the unmanned space vehicle to autonomously make its own last-minute tweaks for flight patterns.

Pollux also has a single-stage parachute, rather than the three-stage parachute used by Castor in 2007. Castor's three-stage parachute did not slow it down enough to avoid some damage upon landing two years ago, but Pollux's handlers seem confident that they can better control the newer prototype and slow it down enough to require just the single-stage parachute.

Two experiments are also slated to ride piggy-back aboard Pollux.

The first is a systems-on-a-chip designed by the company Strago Ricerche, which will help gauge accelerations for the flight. The second is a physics experiment by second grade schools of Italy's Apulia region that will survey atmospheric opacity due to aerosols.

The flights of Castor and Pollux may also help inform other ongoing efforts to develop space planes. The British company Reaction Engines Limited received initial funding last year from the European Space Agency and British government to begin developing its Skylon space plane concept.

The U.S. Air Force has its own secretive space plane set for launch later this year.

Russo and CIRA have already begun planning beyond their twin space vehicle prototypes. A hypersonic version that could reach Mach 7 or 8 is on the drawing boards due to collaboration with the University of Queensland and Australia's Department of Defense.

## **RUSSIA TO TRACK GLONASS SATELLITES FROM ANTARCTIC STATION**

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*Staff Writers, RIA Novosti (Source: [spacedaily.com](http://spacedaily.com))  
8 February 2010*

The Academician Fyodorov scientific research vessel has arrived at the Russian Antarctic outpost of Bellingshausen on a mission to set up a station for tracking the GLONASS navigation satellites, the Voice of Russia reported.



Glomass - the Global Navigation Satellite System - is the Russian equivalent of the U.S. Global Positioning System, or GPS, and is designed for both military and civilian use. Both systems allow users to determine their positions to within a few meters.

Russia currently has a total of 22 Glomass satellites in orbit, but only 16 of them are operational.

Three satellites have been temporarily withdrawn from the grouping over technical problems, one satellite will be decommissioned and two new satellites are expected to enter service in the near future.

The Glomass system requires 18 operational satellites for continuous navigation services covering the entire territory of Russia and at least 24 satellites to provide navigation services worldwide.

A total of 9.9 billion rubles (\$360 million) was allocated for the Glomass project from the federal budget in 2007, and 4.7 billion rubles (\$170 million) in 2006.

An additional \$2.6 billion was allocated to develop the system in September 2008.

## **RUSSIA LAUNCHES 3 NEW NAVIGATION SATELLITES**

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*Stephen Clark [space.com](http://space.com)*

*1 March 2010*

Three more Glomass navigation satellites were dispatched to space Monday, ensuring the network continues providing positioning services to Russian territory as officials seek to expand it to global coverage.

The Glomass constellation is Russia's counterpart to the U.S. Global Positioning System. Glomass satellites provide users with navigation coordinates, velocity and precise timing information.

The replenishment satellites blasted off aboard a Proton rocket at 2119 GMT (4:19 p.m. EST) from the Baikonur Cosmodrome in Kazakhstan. The Proton blazed a dazzling trail into the sky above Baikonur, where it was just after midnight local time.

The first stage's six main engines gave way to the Proton's second stage about two minutes after liftoff. The Proton flew out of sight of ground tracking cameras about six minutes into the mission.

Within the first 10 minutes of the flight, the rocket was supposed to release the Glomass payloads and the Block DM upper stage in space.

The Block DM is expected to fire its main engine twice to push the Glomass satellites into a circular orbit 12,000 miles high with an inclination of about 64.8 degrees.

The upper stage will release its grasp on the Glomass spacecraft before 0100 GMT Tuesday (8 p.m. EST Monday).

Each satellite weighs about 3,000 pounds at launch, including maneuvering fuel to maintain the craft's orientation in space. The modernized Glomass M spacecraft are designed to operate for seven years in orbit, according to their manufacturer, Information Satellite Systems Reshetnev Co.

Glomass satellites broadcast navigation signals to military and civilian users from their orbital perch, reaching ground receivers across a swath of Earth nearly stretching from pole to pole.

According to a Russian Space Agency Web site, there are 18 operational satellites in the fleet as of March 1. Two more satellites are out of commission for maintenance.

The constellation is spread among three orbital planes, each designed to contain eight satellites to maximize global navigation coverage. The satellites launched Monday are headed for Plane No. 3, according to the Russian Space Agency.

Global service requires 24 healthy Glomass satellites, while complete coverage of Russian territory demands 18 operational spacecraft.



Three Glonass platforms were delivered to orbit during another Proton launch last Dec. 14, and another trio is scheduled for launch in August, Russian space officials said.

Monday's mission was the third Proton flight of the year. Between 12 and 14 Proton launches are on the books for 2010, including commercial and government missions.

The next Proton launch is scheduled for March 20 with the EchoStar 14 direct broadcasting satellite for the United States.

## **PUTIN SAYS GLONASS GPS SYSTEM MUST GO COMMERCIAL**

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*Staff Writers,RIA Novosti (Source: [spacedaily.com](http://spacedaily.com))  
16 February 2010*

Russian Prime Minister Vladimir Putin has proposed on Monday introducing the Glonass navigation system throughout the country's regions and getting it onto "commercial rails."

Glonass - the Global Navigation Satellite System - is the Russian equivalent of the U.S. Global Positioning System, or GPS, and is designed for both military and civilian use. Both systems allow users to determine their positions to within a few meters.

"Our system will actually be global and cover the entire globe," Putin said during a meeting with Deputy Prime Minister Sergei Ivanov earlier today.

"However, it should be commercialized so as to make it more effective," he added.

According to Putin, the Glonass system is highly competitive and has a distinct advantage over its European counterparts.

"As far as I know, they only have two satellites in orbit now, while we have a whole grouping that can provide navigation services covering the entire territory of the Russian Federation," he said, adding that another six satellites would be orbited later this year.

He also stressed that local authorities should take it onto themselves to introduce the system across the regions to be used in trains, aircraft, water and public transportation, taking the republic of Bashkortostan as an example where the introduction of the system has significantly improved fuel economy in the public transportation services.

Russia currently has a total of 22 Glonass satellites in orbit, but only 16 of them are operational. The system requires 18 operational satellites for continuous navigation services covering the entire territory of Russia and at least 24 satellites to provide navigation services worldwide.

The Glonass navigation satellite system is expected to start operating worldwide by the end of 2010.

## **RUSSIA WANTS TO CHARGE MORE FOR RIDES TO SPACE**

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*Staff Writers [spacedaily.com](http://spacedaily.com)  
9 February 2010*

Russia, which is set to hold a monopoly on flights to the international space station (ISS), wants to charge more for rides on its Soyuz rocket, the space agency head said Tuesday.

"At a meeting of the space agency chiefs in Tokyo, I want to discuss the maintenance of transport to the station," Roskomos head Anatoly Perminov was quoted by the Interfax news agency as saying.

"We have an agreement until 2012 that Russia will be responsible for this. But after that? Excuse me but the prices should be absolutely different then!"

When NASA retires its long-serving shuttle fleet as planned later this year, the United States and other countries will be wholly dependent on Russia to fly the station's six-man crew to and from orbit.

NASA has signed a deal worth 306 million dollars (224 million euros) with Roskomos for six rides to the ISS in 2012 and 2013, or a charge of 51 million dollars per US astronaut.

But with space now limited aboard the Soyuz rocket, Russia looks set to curb its lucrative space tourism service, for which it had charged cosmos-crazed tycoons 35 million dollars (28 million euros) for the ultimate adventure.

The floating ISS research station was to be closed in 2015 and ditched in ocean like its predecessor the Russian Mir station, but the 16 countries involved are in talks to extend the station's life to 2020.

## **RUSSIA PLANS TO RESUME SPACE TOURISM**

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*Staff Writers [space-travel.com](http://space-travel.com)*

*19 March 2009*

Russia says it could offer more seats than ever to space tourists when the program begins again in two to three years.

Russian halted the program last year because all seats aboard its spacecraft were needed to ferry crew to the International Space Station.

The nation's RSC Energia now has the capability to build five Soyuz spacecraft per year instead of four, which means one spacecraft could be designated for space tourists after 2012, RIA Novosti reported Friday.

Roscosmos, the Russian federal space agency, began ferrying wealthy tourists in 2001 with the flight of Dennis Tito, an U.S. businessman.

In all, seven space tourists have made the journey, the latest, Canadian Guy Laliberte, founder of Cirque du Soleil, who flew to the space station in October.

## **IRAN — INFUSED WITH THEIR OWN ORBITAL POTENTIAL**

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*[satnews.com](http://satnews.com)*

*16 February 2010*

Iran has revealed the development of a new Simorgh space booster and three new satellites that include an imaging spacecraft that may provide Iran with a rudimentary space reconnaissance capability. Iranian president Mahmoud Ahmadinejad also indicated that Iran may be studying the use of its new space capabilities for a rudimentary anti-satellite weapons capability, by noting that the new booster will enable Iran to fly missions up to 621 mi. (1,000 km.) altitude.

The new satellites set for launch include the Toloo (Dawn) imaging satellite, a 220 lb. rectangular-shaped satellite that is the largest of Iran's new spacecraft, which may be launched as early as this month or in March, the Iranians said. The satellite will be launched into a 300 mi. orbit and is designed to operate for three years and was built by the Iran Electronics Industries Co. It may well be a dual-use payload for civil and military ground imaging purposes. But even a medium resolution system would enable Iran to better target military sites in Israel, such as the Israeli Arrow anti-ballistic missile facilities.

The second is the Navid (Good News) communications satellite — this low altitude spacecraft has been developed, in part, by engineering students and is designed to provide store and forward communications services.

The third satellite is Mesbah-2, another store and forward communications satellite design that's planned for launch during 2011.

The new Simorgh ICBM is being developed into a two-stage launch vehicle. This booster and its upper stage have more relevance to ICBM range extension than does the Safir, which launched the Omid satellite in 2009. The Simorgh rocket is 89 ft. long, and has a mass of 85 tons. Its first stage uses a four nozzle propulsion system with 290,000 lb. of liftoff thrust. The Iranians did not provide any significant information on the vehicle's upper stage, possibly because that directly involves use of the same configuration for an ICBM. (Source: [Spaceflight Now](#))

## **STATIC TESTING OF GSLV- MkIII LAUNCH VEHICLE CONDUCTED**

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[isro.org/pressrelease/contents/2010/images/L110.jpeg](http://isro.org/pressrelease/contents/2010/images/L110.jpeg)

6 March 2010

Indian Space Research Organisation conducted the static test of its liquid core stage (L110) of GSLV Mk III launch vehicle, for 150 seconds at its Liquid Propulsion Systems Centre (LPSC) test facility at Mahendragiri at 16:00 hrs yesterday (March 5, 2010).

While the test was originally targeted for 200 seconds it was stopped at 150 seconds since a deviation in one of the parameters was observed. About 500 important parameters were monitored during the static test. The next static test for 200 seconds will be conducted after analysis of this data.

GSLV Mk III launch vehicle is being developed for launching 4 tonne class of satellites in Geo-synchronous Transfer Orbit (GTO). Measuring 17 meters in length and 4 meters in diameter, L110 is an earth storable liquid propellant stage with propellant loading of 110 tonnes. L110 stage uses two high-pressure Vikas engines in a clustered configuration and draws its heritage from the second stage of PSLV and GSLV and strap-ons of GSLV.

While in PSLV and GSLV, the liquid stage with single engine configuration burns for 150 seconds, the GSLV-MkIII requires burning for 200 seconds in a twin engine configuration.

## **NEW SAT WILL BOOST INDIA'S SURVEILLANCE, EW PLANS**

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Vivek Raghuvanshi [defensenews.com](http://defensenews.com)

12 February 2010

India is developing an advanced military surveillance satellite capable of picking up a conversation between two telephones as well as taking high-resolution pictures.

The Communication-Centric Intelligence Satellite (CCI-Sat) will be launched into orbit in 2014, said a senior scientist at the state-owned Defence Electronics and Research Laboratory, Hyderabad, which is developing the \$25 million satellite.

The CCI-Sat is part of a high-priority plan to develop electronic warfare (EW) systems for India's Army, Navy and Air Force, the scientist said.

Meanwhile, India is ready to put into orbit another homemade satellite, Cartosat-2B, in the next two months. That satellite also will be used for military purposes, Defence Electronics and Research Laboratory sources said.

Last year, India launched its made-in-India RISAT-2 military satellite, which is keeping a high-resolution eye on the country's borders and coastline in case of terrorist infiltrations.

Cartosat-2, like the U.S. satellite Ikonos, delivers 1-meter-resolution imagery, second only to the Quickbird, which offers an incredibly close 60-centimeter resolution - all from a distance of 800 kilometers to 900 kilometers above the Earth, said a scientist from the Indian Space Research Organisation (ISRO).

The ISRO and Defence Research and Development Organisation are collaborating on a dedicated naval satellite that will have a 1,000-nautical-mile footprint over the Indian Ocean. India also plans to launch that satellite this year.

## CHINA STUDIES MOON ROCKET

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Bradley Perrett [Error! Hyperlink reference not valid](#)  
5 March 2010

China is studying the design of a Moon rocket in the class of the Saturn V, as the Obama administration proposes canceling the U.S. successor to the Apollo launcher, Ares V.

The country also is developing another new rocket, the “medium thrust” Long March 7, the China Academy of Launch Vehicle Technology says. This new launcher joins the Long March 5 heavy rocket and the Long March 6, which was mentioned last year and is now defined as a “small-thrust” launcher. Long March 5, 6 and 7 will form a family of rockets, it says.

Chinese space officials have said that the Long March 6 was based on the side boosters of the Long March 5. Those side boosters come in two sizes, which could be arranged variously as first or second core stages or as boosters. Long March 7 is therefore likely to be a more powerful combination of the same collection of equipment.

China said last year that development of Long March 6 had begun and that it would appear in 2013, a year before Long March 5.

The Long March 5 has a core diameter of 5 meters (16 feet) with boosters of either 3.35 meters or 2.25 meters, officials say. The 3.35 meter diameter, the same as that of the original Long March series (Long March 1, 2, 3 and 4) was chosen as the largest that would fit within the loading gauge of the Chinese railways, one program executive told Aviation Week last year. Established tooling could also be used with the 3.35 diameter booster, even though the materials and structural design would be different, that executive said.

But the facilities of the space industry base under construction at Tianjin will be adaptable to handle rocket diameters of 8 or even 10 meters, an official there said last year, hinting that the plant was prepared to build an equivalent of the Saturn V, whose first-stage diameter was 10.1 meters.

Confirming that such a Chinese Moon rocket is at the study stage, the vice-president of the China Academy of Launch Vehicle Technology, Liang Xiaohong, says it will have a thrust at lift off of 3,000 tons. The Saturn V’s S-1C first stage generated 7,648,000 lb. (3,470 metric tons) of thrust at sea level.

Liang says the payload of the Moon rocket has not been defined, which seems to suggest that the achievable launcher technology will determine the scope of the mission, rather than the desired mission determining the performance of the rocket.

The Chinese government has not authorized a manned Moon mission, but it is clear the country’s space sector is at least being allowed to prepare for one.

The latest announcements have been reported by Xinhua news agency and the China Daily, an English-language newspaper whose content is intended for foreign consumption.

Liang says Long March 5 launchers will be used in the preparatory stage of a Moon landing.

Potentially, there will be a lot of them. The Tianjin base will be able to build two a year when its first stage is completed in 2011 but its capacity will eventually rise to one Long March 5 per month.

About 100,000 square meters of workshops have been completed so far at Tianjin, with an initial investment of 1.5 billion yuan (\$220 million). The final investment will be 10 billion yuan.

"A moon landing program is very necessary, because it could drive the country's scientific and technological development," the China Daily quotes Bao Weimin of the Chinese Academy of Sciences as saying.

The Long March 5 will be needed for China's plans for a full space station due to follow an unknown number of Tiangong laboratories before 2020. The station's core module will have a mass of 20 tons. But Qi Faren, who designed the Shenzhou manned spacecraft, says the Long March 5 will first be used to launch the 8-9 ton Fengyun weather satellite to geostationary orbit. The current Long March series could not perform that mission.

Long March 5 will serve for 30 to 50 years, Liang says.

A modified Long March 2F will launch Tiangong 1 next year. Liang says that rocket has needed 170 modifications, including 38 major changes, to launch Tiangong 1, which will be initially unmanned but eventually able to accommodate astronauts performing experiments.

## CHINA'S SPACE STATION PLAN DELAYED FOR 'TECHNICAL REASONS'

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Staff Writers [spacedaily.com](http://spacedaily.com)

3 March 2010

China has postponed the next step in its ambitious space station programme until 2011 for technical reasons, state media said Wednesday.

China had originally planned to place the Tiangong-1 space module in orbit late this year and undertake experimental docking manoeuvres in subsequent missions, Xinhua news agency cited rocket designer Qi Faren as saying.

But the initial launch has now been delayed by a year due to "technical reasons", Qi said, without elaborating.

Qi was speaking to the media on the sidelines of a meeting of a legislative advisory body, which convened on Wednesday, two days before the start of the annual session of China's rubber-stamp parliament.

China became the third nation to put a man in space when Yang Liwei piloted the one-man Shenzhou-5 space mission in 2003.

In September 2008, the Shenzhou-7, piloted by three "taikonauts" or astronauts, carried out China's first space walk.

The Tiangong-1, or "Heavenly Palace," is seen as the building block of China's maiden space station.

Weighing about 8.5 tonnes, it would provide a "safe room" for Chinese astronauts to live in and conduct research in zero gravity.

After being placed in orbit, the Tiangong-1 would dock with the unmanned Shenzhou-8 spacecraft in the country's first space docking -- a feat to be controlled remotely by scientists on the ground.

Qi said Shenzhou-9 and Shenzhou-10, carrying two to three astronauts, would also dock with the orbiting module in successive years.

He said other key technologies being worked on in the space station programme include the replenishment of propellant, air, water and food for the space module as well as a life support system.

The International Space Station began with the launch into orbit of the first station element, a Russian-built module, in 1998. The first full-time crew arrived two years later.



## COMMERCIAL

### SPACE SIZZLING...

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[satnews.com](http://satnews.com)

23 February 2010

Euroconsult has revealed worldwide government expenditures for space programs grew by 10 percent in 2009 over 2008, reaching an historical peak of \$68 billion. According to Euroconsult's new report *Profiles of Government Space Programs: Analysis of 60 Countries & Agencies*, more than 50 countries are now investing in domestic space programs and annual budgets in six countries (the United States, Russia, Japan, China, France and Germany) were over \$1 billion in 2009.

The number of space agencies has significantly increased with previously inactive countries investing in space applications/technologies and creating dedicated organizations to manage and implement the programs, as shown recently in Mexico, Vietnam, Venezuela, and Turkey, among others. Both civil and defense spending has grown. Government expenditures for civil space programs totaled \$36 billion in 2009, a 9 percent increase over the previous year. Spending for defense space programs (classified and non-classified) is estimated to have climbed to \$32 billion in 2009, a 12% increase compared to 2008.

"2009 has been an excellent year for the space sector; governments increased their commitments to space applications, showing that they view space as an efficient investment in a period of tough economic conditions and tight budgets," said Steve Bochinger, Managing Director of Euroconsult North America and editor of the report. "However, the sector should be prepared for funding to be reigned in over the next several years. Most governments will return to budget austerity after a short period of unusually massive spending to support their national economy; and we see the confirmation of what we anticipated some years ago: a period of lower investment in the coming years due to the completion of major space programs in many countries. This combination of factors could seriously impact both public and industry stakeholders."

This trend is already apparent in the US with national space expenditures culminating at \$48.8 billion in 2009 (civil and defense combined) but with a period of major uncertainties ahead. In the defense sector, the FY2011 budget foresees an 8% decrease for the Department of Defense space program due to the near completion of SATCOM, Satnav and Reconnaissance programs, combined with the cancellation of major initiatives such as TSAT. In addition, the decision to terminate NASA's Constellation program and to put the future of US-based human spaceflight on hold demonstrates more careful management of government money than what was observed during the last decade.

In Europe, space programs have benefited from a budget of \$7.9 billion in 2009 to finance national, multilateral and European civil and defense initiatives. The last Ministerial Council awarded the European Space Agency \$14.5 billion (€9.9 billion) for the period 2009-2013, though many projects remain at a preliminary stage and must get approval at the next Ministerial Council in 2011. GMES and Galileo deployments should drive European spending in the short-term but key decisions will be needed in the future to drive long-term initiatives.

The Japanese space program has been reinvigorated by the adoption of the Basic Space Plan which outlines new objectives and anticipates continuous budget increases to fund civil and security applications. In 2009, Japan's space program spending surpassed \$3 billion. Russia has had one of the most dynamic space programs, with government expenditures growing at over 40 percent on average per year during the last five years. The national space budget reached an historical peak of \$2.8 billion in 2009 but should experience more modest growth in the coming years. Chinese and Indian space programs are driven by independence and self reliance in space technologies, applications and space science. With investments exceeding \$2 billion and \$900 million respectively in 2009, these countries

can now claim leadership and have become clear partners of choice for established and emerging countries.

A key trend in recent years has been the emergence of new space programs around the world. 26 countries such as Venezuela, Mexico, Algeria, Egypt, Nigeria, Indonesia, Thailand, and Vietnam, among others, have initiated a domestic program with investment usually between \$5 million and \$50 million focusing on one type of application, often in the area of Earth observation or satellite communications. Many of these countries are both investing in satellite capabilities and looking to acquire know-how through technology transfer in order to progressively build local capabilities in more advanced space technology. A key question for the next few years will be whether these newcomers in space have the political will, as well as the adequate financial resources, to sustain or increase their investments in space-based applications and technologies following the completion of first generation space programs.

## **A GIANT LEAP FOR COMMERCIAL PROJECTS**

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*Ann Schrader [denverpost.com](http://denverpost.com)  
19 February 2010*

The next space-science advancements will be measured and tested by researchers in commercial, suborbital vehicles developed by private companies.

About 250 scientists, NASA officials and spaceflight-service providers Thursday discussed how to make the dream of anyone going into space a reality.

Attendees were nearly giddy at the opportunities opened up by President Barack Obama's proposed change in direction for NASA that steers money and emphasis to commercial space development.

The nonprofit Southwest Research Institute, based in Texas with a large employee group in Boulder, announced a \$1 million initiative on Thursday to fly next-generation suborbital experiments with a crew.

"We sure will not be waiting on the government," said Alan Stern, associate vice president of the institute's space-science and engineering division. "We will begin buying seats (on space vehicles) and fly our own payload specialists."

Astronauts and cosmonauts currently are the only ones able to tend science experiments in space. Stern and others talked of the value of a space scientist being able to conduct research in his or her work environment, much as a geologist does on Earth.

NASA has plans to pay for suborbital flights — ones that ascend to about 70 miles high for only a few minutes — for research and to test technology.

"We're looking for really cool proposals where we can fly stuff into space quickly and get some cool results," said Pete Worden, director of NASA's Ames Research Center, which develops mission-support technology.

Private companies are champing at the bit to provide flight services. Flights could begin in 2011, with vehicles such as Virgin Galactic's SpaceShip Two and XCOR Aerospace's piloted, two-seat reusable launch vehicle called Lynx.

Space has been technologically stagnant "for a very long time" because missions are expensive and people don't want to risk money on something new, said Jeff Greason, president of XCOR Aerospace.

The visits to space aboard commercial vehicles would cost about \$200,000 per seat for perhaps four or five minutes of flight. "The brevity of spaceflight is not what is important," Stern said, adding that the quality of information gathered is worth it.



## PROSPECTS AND CONCERNS FOR EXPORT CONTROL REFORM

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Jeff Foust [www.thespacereview.com](http://www.thespacereview.com)

29 March 2010

In the space industry in the US, export control reform is a bit like the weather: everyone likes to talk about it, but doing anything about it is a whole other matter. In late 1998 Congress passed a defense authorization bill that included a section moving satellites and related items to the US Munitions List (USML), subjecting it to the control of the International Traffic in Arms Regulations (ITAR). Since then, the industry, citing the adverse effects that move has had on companies trying to export such items even to friendly nations, has lobbied to reverse that shift, but with little success.

Now more than ever before, though, there's hope for significant export control reform, including reversing that 1998 move of satellites to the USML. Legislation currently working its way through Congress would allow the White House to make that change as well as other reforms to export control policy. Other studies of export control reform are underway in the administration, including proposals that could be announced in the immediate future. However, while the prospects for reform look good, some warn that—particularly in a contentious election year—there's no guarantee anything will be enacted.

### Satflex and other reforms

The biggest potential reform is contained in [HR 2410](#), a State Department authorization act currently making its way through Congress. Included in the bill is a provision dubbed “Satflex” that would give the president the authority to remove satellites and related components from the USML. Even if that authority wasn't exercised, other aspects of the bill would still provide reform, including setting goals for rapid review of license applications and also performing a rolling review of all the items contained on the USML to determine if they still warrant protection under ITAR.

Satflex finally came about after members finally were convinced of ITAR's adverse impacts after years of lobbying by the industry. “However, the problem with getting Congress to move on those concerns is that until very recently there hasn't been any clear evidence that export controls were responsible for problems and hindrances to US satellite exports. These were always attributable to other factors, such as a general downturn in the industry,” said David Fite, a senior staff member on the House Foreign Affairs Committee but speaking for only himself, during a panel on ITAR earlier this month at the Satellite 2010 conference outside Washington.

What changes peoples' minds on Capitol Hill about this, he said, was the move by “a major European manufacturer” to sell so-called “ITAR-free” satellites that contain no US-built components and hence are not subject to US export controls. Fite didn't name the manufacturer but it was a clear reference to Thales Alenia Space, which has sold several such communications satellites. “This has changed the environment, I think, significantly,” he said.

The Satflex provisions in the bill have two important caveats, Fite said. One is that removing satellites and related components required the notification of, and consent by, key congressional committees. This is important, he noted, not just for Congress's oversight role but to also help improve the bill's prospects for passage. The other caveat still prevents the export of satellites and components to China. “Had there been no special restriction on comsat sales to China,” Fite said, “I have no doubt that this provision would not have passed the House.”

With those caveats in place, HR 2410 did pass the House last June. The Senate has not yet taken up the bill, though, raising concerns by some in the space industry that this opportunity for reform might be lost. Fite, though, said that the current authorization bill was “somewhat on schedule” compared to similar bills in previous congresses. He expected the Senate to pass its version of the bill this summer, with a conference report reconciling the differences between the bills completed by September.

Meanwhile, the administration is taking up its own efforts at export control reform. In [a speech earlier this month at the Ex-Im Bank](#) in Washington, President Obama mentioned efforts underway to institute changes to export control policies. “What we want to do is concentrate our efforts on enforcing controls on the export of our most critical technologies, making America safer while enhancing the competitiveness of key American industries,” he said. “We’ve conducted a broad review of the Export Control System, and Secretary [of Defense Robert] Gates will outline our reform proposal within the next couple of weeks.”

“People are excited because the president himself has taken export control under his wing,” said Bill Reinsch, president of the National Foreign Trade Council, during the Satellite 2010 panel. The interagency reform effort, he said, had started with simply making short-term changes but has now evolved into an overhaul of the overall export control system. Although the specifics of that reform have not been released, he expected to see a phased series of reforms in the process of handing export controls.

Separate from that effort is a study underway by the Defense Department known as the “1248 review” after the section of [the FY2010 Defense Department authorization act](#) that ordered it. The legislation calls for “an assessment of the national security risks of removing satellites and related components from the United States Munitions List”. That report, which will feature input from industry and other government agencies, will include recommendations of what space-related technologies should remain on the USML as well as other improvements to space export control policies and processes. “With all the export control reform efforts that are ongoing, we see what we’re doing as consistent with those activities,” said Jay Walding of the DoD’s Defense Technology Security Administration (DTSA) at the Satellite 2010 panel. That report is due to Congress in late April.

#### Hopes and hindrances in an election year

Enacting export control reform of some kind has the backing of other government officials involved in both civil and military space, who are concerned about the obstacles of the current system to international cooperation as well as negative effects it has on the domestic industrial base.

“I am very hopeful that, if we don’t see a broad revamping of export regulations and control, that we will at least see some opportunities open up for NASA to be included in some of the exceptions as the DoD and others are,” NASA administrator Charles Bolden said in a speech earlier this month, in respond to a question about ITAR reform. “I’m really hoping that it happens, and it happens soon.”

“We’re working hard to change export controls, so that our industry can more easily compete in the international market,” Gary Payton, the deputy under secretary of the Air Force for space programs, said in a speech Friday at a Space Transportation Association luncheon on Capitol Hill. He wants to see such changes to improve the robustness of the industrial base that also supports his missions. “The House had done some good work there. We’d like to see the Senate pick up that same motivation.”

It’s not certain, though, that Congress will follow through, particularly during what is shaping up to be a particularly contentious election year. In his 11 years on Capitol Hill, Fite said, “I have never seen an environment that has been this partisan.” Reinsch concurred. “The danger is that this will become a political issue in an election year, which means it’s not going to be addressed on its merits, it will be addressed by slogans.”

Reinsch said export control reform could become a partisan issue, with Republicans seizing on any reforms proposed by the White House as evidence that they’re soft on national security. He said he was particularly concerned that the president linked export control reform with jobs in his speech earlier in the month. “You can’t win an export control reform fight talking about jobs and exports,” he said. “The only way to win an export control fight is talking about national security.”

“The Republicans in the Congress, particularly in the Senate, are already sharpening their rhetoric, their talking points for this,” he warned. When those attacks come, he said, the question will be whether the

president fights back. “Will he persist and push it through, or will all the Democrats fold?” he asked. “That’s why my optimism is tempered with caution.”

The irony in this debate, though, is that even if satellites and their components are removed from the USML, the effect on the space industry may not be as great as reform proponents hope for—or as dire as reform opponents fear. John Ordway, a lawyer with, Berlinger, Corcoran & Rowe, LLP who specializes in export licensing, noted that one of the biggest complaints about ITAR, the long delays in getting an export license, have been addressed in previous reforms by the Bush Administration that set a goal of adjudicating license applications within 60 days. “In my experience, 60 days is pretty much the norm now,” he said. “Generally, the ITAR licensing process is working smoothly.”

Moving satellites and their components off the USML—presumably back onto the Commerce Control List and thus under the jurisdiction of the Commerce Department—would not necessarily make things that much faster and smoother for companies. “I’m not sure it would be a really huge deal,” Ordway said. The biggest difference, he said, might be in the culture in the Commerce licensing office, which he said would be more willing to be advocates for the companies than in the current system.

Those issues have not deterred advocates for reform. “It’s long overdue,” said Marjorie Chorlins, director of government and regulatory affairs at Lockheed Martin, at the end of the Satellite 2010 panel. “It’s an uphill climb, but it’s a much-needed one.”

***NSF Editorial Note:** HR 2410 is the Foreign Relations Authorization Act for Fiscal Years 2010 and 2011.*

## **SATELLITE MAKERS PREPARE FOR DOWNTURN**

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Michael A. Taverna [aviationweek.com](http://aviationweek.com)  
19 March 2010

Virtually all market indicators suggest the telecom satellite industry will continue to resist the lingering economic malaise, but how much that will benefit satellite manufacturers and launch providers remains to be seen.

Revenues and earnings are surging in the fixed-service satellite (FSS) sector, which accounts for the lion’s share of industry business, driven by higher prices and hot demand from emerging nations in Asia, Africa and Latin America. Intelsat, the FSS leader, and Telesat Canada reported record revenues and earnings before interest, taxes, depreciation and amortization (EBITDA) for 2009, and predicted the same this year.

Strong revenue and EBITDA growth at SES, the No. 2 FSS operator, prompted it to significantly augment guidance for the next five years. Eutelsat, which showed a solid improvement in revenues and EBITDA in reporting its first-half results, upped its forecast as well.

However, this expansion may not translate into new satellite purchases because the big wave of FSS fleet renewals is passing. SES, which has 14 satellites in the pipeline, says it will start winding down satellite expenditures in 2011 and by 2014 expects to spend barely 15% of revenues on new hardware, compared to 50% now.

Eutelsat, which has four spacecraft under construction, will for all intents and purposes complete its present phase of fleet modernization after it places orders to replace three 1998-2000-era spacecraft, executives say. This is anticipated within 12 months or so.

Intelsat CEO Dave McGlade says after the eight spacecraft now on order are launched in three years’ time, the company “will opportunistically supplement [its] capacity with modest investments,” including two additional replacement spacecraft announced on Mar. 9. Capital expenditures are due to drop to \$450-525 million in 2012, down from \$800-900 million in 2010-11. Telesat executives say that once the

next two spacecraft now in production are launched, in late 2011 and mid-2012, respectively, only two satellites will be due for renewal in the next six years, and only one of these is likely to be replaced.

The industry consensus is that satellite sales will peak in 2011 and begin tailing off in 2012-13. Euroconsult forecasts that an average of 23.5 geostationary telecom satellites per annum will be launched in 2009-19, with a high of 30 early in the decade and a low of under 20 in the later years.

A pick-up in low-Earth-orbit telecom and Earth-observation satellites will help compensate, but the total value of LEO spacecraft will be less than 20% of GEO sales, Euroconsult predicts.

The extent to which new growth could cushion the fall in satellite orders will depend to a great extent on the rate of expansion of new applications like broadband and mobile satellite services—particularly in the developing world—and the pace at which military use of commercial FSS bandwidth catches on (see pp. 51-56). However the health of the FSS industry's bread-and-butter broadcasting and video market will also play a key role, says Euroconsult's space and communications director, Rachel Villain.

Euroconsult forecasts that satellite TV demand will accelerate as consumers in emerging markets like India, Russia and Brazil rush to sign up for new TV platforms and customers in established regions trade up for higher definition. The number of satellite TV subscribers is forecast to nearly double, to 240 million, by 2019.

However, the Paris-based consulting company cautions that TV revenue during that period will grow at a slower pace—40-50%—because of the economic crisis and aggressive competition, particularly in Europe and emerging markets. The developing world is forecast to represent 70% of subscriptions a decade hence, compared to 45% now. Nevertheless, shakeouts should allow prices to rebound over time, Euroconsult notes.

A big unknown in the revenue equation is how fast customers will sign on for high-definition TV and digital video recorder download services, which generate higher churn rates and average revenue per subscriber. Markets in North America and Europe, in particular, will depend on HDTV to sustain future growth. "This could be the breakthrough year for HD," says Villain.

Forecasters are also bullish on 3DTV. On Mar. 1, SES World Skies announced plans to run a series of trials to test the end-to-end chain and distribution setup for 3DTV. "We're starting to see manufacturers making 3DTV sets, but it's still too early to see how this will play out," says SES Chairman/CEO Romain Bausch.

The willingness of the public sector to help finance new initiatives, via rural economic stimulus plans or export credit agency funding, could prove a boon, not only in broadband and MSS but in FSS, too. And although government space spending is expected to flatten, notably in the U.S., reliance on commercial operators, either through batch capacity purchases or piggyback payloads, is likely to provide a further stimulus. A recent example is a U.S. Navy contract to Intelsat under the Commercial Broadband Satellite Program that could potentially be worth \$543 million.

On the other hand, consolidation, especially among the many new mobile satellite service projects, may serve as a brake on new hardware purchases. For example, WildBlue's takeover by ViaSat last year nixed plans for a new spacecraft by the big U.S. broadband operator.

The FSS sector is seeing signs of stirring, too, most noticeably in Asia and Latin America. Direct-to-home operator EchoStar recently agreed to acquire Mexican FSS operator Satmex, while Intelsat and SES picked up orbital assets jettisoned by failed Asian startup Protostar. Hong Kong's Asia Broadcasting Satellite formed a strategic alliance with Eutelsat, too, and SES set up a broadcasting venture with Yah Satellite of the United Arab Emirates. Eutelsat says more such steps may follow. "If we make a move, it's more likely to be east than west," says Deputy CEO Jean-Paul Brillaud.

At the same time, the tendency of emerging nations to own their own satellite assets shows little sign of abating. Ukraine, Laos, Angola, Argentina and Sri Lanka have all recently announced national

SATCOM plans. A key question, Euroconsult says, is whether newcomers will have the political will and resources to sustain these developments beyond their first-generation acquisition. Significantly, a group of Andean countries last month turned to SES to help develop an orbital position it owns in South America, despite earlier moves by one of the countries, Bolivia, to acquire a spacecraft of its own.

Meanwhile, the effects of the impending satellite order downturn are already being felt. EADS Astrium, which shared the SATCOM sales lead last year with Thales Alenia Space and Space Systems/Loral, forecasts that revenues and orders will be flat this year. Growth at Thales Alenia Space and SS/L is expected to be limited, too.

The big two launch providers, Arianespace and International Launch Services, continue to enjoy buoyant manifests and pricing for now. But the return of Sea Launch to the market, if it occurs, would likely spell trouble, they say.

Some of the slack in satellite sales could be taken up by other suppliers. OHB-System, which recently beat out Astrium for two European government awards, predicts 2010 will be a growth year. Orbital Sciences' acquisition this month of General Dynamics' satellite business should accelerate marketing of a new 7-8-kw. bus that would bring it into the middle of the satellite spectrum. Boeing expects its 702B platform, which gives it a competitive offering in the mid-size segment, to bolster a rebound begun last year. Lockheed Martin is also aiming for more orders. However, the higher dollar could hurt the chances of U.S. manufacturers, and prospects of relaxing technology exchange rules appear to be receding.

Suppliers outside the SATCOM mainstream may also benefit, especially in emerging markets. Canada's McDonald Detwiler Associates and U.K.-based Surrey Satellite Technology Ltd. both made their first SATCOM sales last year, to Ukraine and Sri Lanka, respectively, while Argentina picked a local supplier, Invap, to build its first telecom satellite, with the help of Astrium and Thales Alenia. Russia's JSC Reshetnev Information Satellite Systems landed four orders, including a Yamal 300 deal transferred from Energia. China's CAST sealed a replacement deal for Nigeria's NigComSat-1, as well.

## **RECENT HIGH PROFITS FOR INSURERS ATTRACTING NEW UNDERWRITERS**

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*Space News Staff [spacenews.com](http://spacenews.com)  
5 March 2010*

The recent good performance of insured satellites and launch vehicles has helped generate substantial profit for underwriters, causing new insurance capacity to enter the market and lowering premiums, insurance underwriters and brokers agreed.

One of the most visible signs of the confidence insurers have in the industry is the fact that underwriters are willing to insure single launches for ever-higher amounts of coverage.

Ten years ago, it was difficult to assemble enough underwriting capacity to insure a single launch for much more than \$400 million in combined coverage. Then as now, the most expensive launches are likely to be European Ariane 5 rockets carrying two telecommunications satellites.

But as insurers moved past the big satellite claims that punished the industry in the late 1990s, and as the Ariane 5 rocket logged repeated successes, underwriters became more comfortable with placing ever-larger amounts of coverage on a single launch.

In 2009, the launch of Germany's ComsatBw-1 military telecommunications satellite with Hispasat's Amazonas-2 commercial telecommunications satellite featured a combined package of about \$675 million.

Later this month, an Ariane 5 will carry the identical ComsatBw-2 satellite and the Astra 3B satellite for SES of Luxembourg, with a record \$700 million in insurance coverage, according to underwriters.



Chris Kunstadter, senior vice president at underwriter XL Insurance of the United States, said part of the reason for the lower rates and higher per-launch insurance limits is the fact that the industry has been in a period dominated by well-proven rocket and satellite hardware.

But Kunstadter and other underwriters cautioned that rates cannot continue to drop without endangering the long-term supply of insurance coverage. "As the saying goes, 'When things are going well, your luck is bound to change,'" said Kunstadter, who said he already sees signs that some insurance policies are including less-rigorous clauses.

Rick Fillers, vice president and head of space underwriting at Paris Re, said he sees the industry heading for a repeat of past cycles in which space-insurance profits attract underwriters who are less technically astute, leading to losses and the eventual exit of these same underwriters and a decline in total available capacity.

Fillers said satellite insurance rates have fallen close to the point where Paris Re will no longer take part out of concern that the industry's long-term viability is being put at risk.

The market counts about 175 satellites insured in orbit for a total value of some \$17 billion, according to XL estimates.

## **WORLDSPACE ANNOUNCES POTENTIAL DECOMMISSIONING**

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*David S. Hilzenrath, Staff Writer [washingtonpost.com](http://washingtonpost.com)  
18 March 2010*

WorldSpace, a bankrupt satellite radio company, is running so low on funds that it is preparing to send its satellites to a premature death.

The Silver Spring company has been in Chapter 11 since October 2008 and announced this week that negotiations with a lender and prospective buyer had fallen apart.

"WorldSpace is planning for a potential de-commissioning of its satellites and reviewing its strategic alternatives in light of the termination of negotiations," the company said in a news release.

WorldSpace was founded by Noah A. Samara, who dreamed of making programming available to the developing world. The stock was first sold to the public in 2005 at \$21 per share, an offering that valued Samara's holdings at more than \$100 million. The stock has since been removed from the Nasdaq stock market and has traded for pennies.

Even before its initial offering, WorldSpace drew attention for its board members and financial backers. Directors included Jack Kemp, a former presidential candidate; Charles McC. Mathias Jr., a former U.S. senator from Maryland; and William Schneider Jr., a former undersecretary of state.

Early investors included Salah Idris, the owner of a plant in Sudan that the United States bombed in 1998, alleging it had ties to Osama bin Laden, and Khalid bin Mahfouz, a Saudi banker who was tied to the BCCI bank scandal of the early 1990s. Both men denied the allegations; when challenged in court, the U.S. government lifted a freeze on Idris's assets.

From the outset, some observers expressed skepticism of WorldSpace's plan to build a business by serving impoverished customers. In a 2005 Washington Post story, one satellite communications consultant said the stock offering reminded him of the tech bubble of the late 1990s.

Company employees did not respond to phone and e-mail messages Thursday.

WorldSpace has two satellites, one to serve Asia and another to serve Africa.

WorldSpace's "dire cash position" has left it "no choice but to prepare to remove immediately the Satellites from orbit to prevent damage to both the Satellites and equipment in orbit owned and operated by others," WorldSpace said in an emergency court filing.

The procedure would involve steering the WorldSpace satellites into a higher orbit, out of the way of others, said Tobias Nassif, vice president of satellite operations and engineering at Intelsat, which would assist WorldSpace.

The satellites' propellant would be dumped and their batteries would be disconnected, leaving them to a frozen death more than 22,000 miles above the earth.

If they were left unattended in the orbital band used by geostationary satellites, they could drift into others, creating debris that could cause more collisions in a cascade of damage, said John Pike, director of GlobalSecurity.org.

A unit of Liberty Media, which had been funding WorldSpace in bankruptcy and negotiating to buy its assets, called off the talks this month. Liberty has also been a major investor in Sirius XM Radio, and WorldSpace could have become a vehicle for Sirius XM to extend its reach internationally.

WorldSpace had previously announced that it planned to stop broadcasting to India, one of its prime markets, on Dec. 31, according to a statement on its Web site. The company said it would not be able to provide refunds to subscribers, although they could file claims with the bankruptcy court.

Staff researcher Lucy Shackelford contributed to this report.



## POLICY AND STRATEGY

### NATIONAL BROADBAND PLAN CALLS FOR CHARGING AGENCIES FOR SPECTRUM USE

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Bob Brewin [nextgov.com](http://nextgov.com)

17 March 2010

In its National Broadband Plan delivered to Congress on Monday, the Federal Communications Commission proposed that agencies pay to use radio spectrum to maximize its potential for commercial use -- a suggestion one federal telecommunications executive called "absurd."

FCC's [plan](#) also calls for reallocating spectrum the Defense Department uses to manage satellites and to communicate with unmanned aerial vehicles and Army troops to commercial wireless broadband systems.

The National Telecommunications and Information Administration manages federal use of spectrum, and FCC suggested in the [spectrum chapter](#) of its plan that Congress should allow NTIA to charge government agencies for spectrum that they currently use for free.

The proposal would introduce market efficiencies to federal spectrum use and help spur the development of commercial broadband wireless services, FCC argued.

The Technology Policy Institute, a Washington think tank, estimated in 2009 that about 23 percent of the nation's spectrum between 3 MHz to 3 GHz is allocated exclusively to federal agencies.

FCC said imposing a fee "may help to free spectrum for new uses such as broadband, since licensees who use spectrum inefficiently may reduce their holdings once they bear the opportunity cost of spectrum."

But the commission said the charge "must avoid disrupting public safety, national defense and other essential government services that protect human life, safety and property, and must account for the need to adjust funding through what can be lengthy budgetary cycles."

FCC backed up its recommendation with an example from the United Kingdom, where the commission's counterpart, the Office of Communications, has imposed a user fee on government and commercial spectrum holders, including the Defense Ministry. Government now include spectrum costs in business cases for major programs, which has resulted in unneeded spectrum being transferred to other uses, FCC said.

The proposal to charge agencies for spectrum is "absurd on its face," said Bernie Skoch, a retired Air Force general with extensive experience in military communications who is now a consultant based in Arkansas. "Why should the Defense Department be charged for the spectrum it needs for its constitutionally defined mission?"

He said the National Broadband Plan implies Defense and other agencies do not use the spectrum they have been assigned efficiently and assumes that much of the spectrum is dormant. But "spectrum is the lifeblood of communications, and when we go to war, it should be there" for use by the military, Skoch said.

FCC also wants to auction off to commercial carriers the spectrum in the 1,755-1,850 MHz band, which Defense uses, pending a study that FCC and NTIA plan to complete in October.

Skoch said multiple Defense systems currently operate in this band, and shifting them to another band will involve huge engineering costs to redesign equipment such as antennas and develop new waveforms.

In its most recent [Strategic Spectrum Plan](#) sent to NTIA in 2007, Defense officials said they viewed the 1,755-1,850 MHz band as "vital for command and control, mission data retrieval, and maneuvering of its many satellites in all orbits from low Earth to geostationary."

The Marine Corps also uses the band for its Digital Wideband Transmission System, which supports ground troops and ship-to-shore operations. It is "the only transmission media available to the Marine Corps with sufficient bandwidth to carry large quantities of critical data such as maps, overlays, intelligence pictures and other data to the battlefield commanders," Defense noted.

Skoch said the band also is used for UAV operations and for the Joint Tactical Radio System's new Rifleman Radio that is under development for infantry units.

Defense did not respond to a request for comment by the time this article was posted.

## **DEFENSE ACQUISITION REFORM PANEL ISSUES FINAL RECOMMENDATIONS**

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*Robert Brodsky [govexec.com](http://govexec.com)  
23March 2010*

The congressional Defense Acquisition Reform Panel on Tuesday approved final recommendations for improving deficiencies in the military's procurement system.

The group passed by a voice vote its [final report](#), which is similar to an interim document issued earlier in March. Once the report is delivered to leadership of the House Armed Services Committee later this week, the panel's work will be complete.

"The panel began with the question of how well the defense acquisition system is doing in delivering value to the warfighter and the taxpayer," said chairman Rep. Robert Andrews, D-N.J. "For most categories of acquisition, only anecdotal information exists about instances where the system either performed well or poorly."

The report calls for improvements to the process for developing contract requirements, incentivizing better performance from the acquisition workforce, reforming the Pentagon's financial management and getting better value from the industrial base.

The panel, appointed in March 2009 by the House Armed Services Committee, recommended the expansion of the newly created Office of Performance Assessment and Root Cause Analysis to track organizations throughout the defense acquisition system in meeting prenegotiated goals for acquisition performance.

"These assessments would not simply be material to fill reports to Congress," Andrews said. "These performance assessments would be linked directly with the things that matter most to the people working in the system: pay, promotion and the scope of their authority. A similar effort is needed for the requirements process."

Pentagon officials also should develop new regulations that include fair, credible and transparent methods for hiring and assigning civilian acquisition staff, and for appraising and rewarding employee performance, the report stated. In addition, the lawmakers recommended extending the Acquisition Workforce Demonstration Program, which focuses on improving personnel management policies and procedures. The five-year program is set to expire in 2012.

Defense also should develop meaningful incentives for the military services to achieve unqualified audits well before the current mandate of Sept. 30, 2017, the panel said. Defense entities that fail to meet this mandate, however, would face consequences such as the loss of some congressional funds, the group said.

In a move heavily favored by industry, the lawmakers called for the repeal of a rule that allows agencies to withhold 3 percent of contract payments in anticipation of taxes owed to the Treasury Department.

The final document incorporates some relatively minor technical changes Defense Department officials suggested during the panel's final hearing on March 11.

Many of the recommendations will be addressed in the House Armed Services Committee's version of the fiscal 2011 National Defense Authorization Act later this year.

## **OBAMA SPACE POLICY TO FOCUS ON INTERNATIONAL COOPERATION**

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Amy Klamper [defensenews.com](http://defensenews.com)

7 December 2009

The White House is expected to complete a review of U.S. space policy as early as this week, setting the stage for executive branch deliberations intended to yield by mid 2011 a new strategy that places a high emphasis on international cooperation.

President Barack Obama called for a broad review of his predecessor's space policies in May in the form of an order dubbed Presidential Study Directive-3. Led by Peter Marquez, director of space policy for the White House National Security Council (NSC), the review is addressing a range of topics, including space protection, cooperation, acquisition reform, export controls and national space strategy.

Sources familiar with the review say a draft policy will be delivered to National Security Adviser James Jones and likely will undergo additional fine-tuning before the president is briefed on it. The review caps a slate of congressionally mandated studies of national security space and defense policy expected to be delivered to Capitol Hill with the administration's 2011 budget request in February.

Sources familiar with the NSC review say it will encapsulate much of the forthcoming 2010 Space Posture Review, a long-term examination of U.S. space strategy and capabilities called for in the 2009 Duncan Hunter National Defense Authorization Act.

The Space Posture Review, conducted jointly by the defense secretary and director of national intelligence, was due to lawmakers Dec. 1, though sources familiar with the study say it will now be submitted to Congress in February.

Former President George W. Bush's 2006 U.S. national space policy drew fire from arms control advocates for what they called a unilateralist tone. Sources said the Obama administration's forthcoming policy will emphasize international cooperation and a consultative approach with allies in addressing space access and other strategic concerns.

"In consultation with allies, the Obama administration is currently in the process of assessing U.S. space policy, programs, and options for international cooperation in space as a part of a comprehensive review of space policy," Garold Larson, alternate U.S. representative to the First Committee of the 64th United Nations General Assembly, said in an Oct. 19 statement.

"This review of space cooperation options includes a 'blank slate' analysis of the feasibility and desirability of options for effectively verifiable arms control measures that enhance the national security interests of the United States and its allies," he said.

Larson said while it is premature to predict specific decisions that will result from the U.S. policy review, Washington will continue to uphold the principles of the 1967 Outer Space Treaty, which guides free access to, and use of, outer space by all nations for peaceful purposes. He also said the United States looks forward to discussing insights gained from the presidential policy review during discussions on the prevention of an arms race in outer space at the 2010 United Nations Conference on Disarmament. The

review will also look at ways to protect critical government and commercial space infrastructure against orbital debris, according to Dick Buenneke, deputy director of space policy at the State Department.

“As the lead spacefaring nation, the United States takes these issues very seriously,” Buenneke, the space policy review team leader for international cooperation, said during a seminar last month at the George Washington University. “The United States has been and will continue to be active in identifying potential hazards and pursuing new initiatives to preserve the safety of flight for both human and robotic space missions.” Buenneke said the U.S. is taking pragmatic steps to improve communication among commercial and government satellite operators to improve situational awareness in space.

“As part of the effort to prevent future collisions, the United States expanded the number of satellites it monitors for risk of collision with other satellites and space debris,” he said. “In addition, the United States provided notification to other government and commercial satellite operators when U.S. space analysts assessed that one operator’s satellite was predicted to pass within a close distance of another spacecraft or space debris.” Last month, Air Force Lt. Gen. Larry James, who commands the 14th Air Force and U.S. Strategic Command’s Joint Functional Component Command for Space, said the U.S. military’s Space Surveillance Network tracks 21,000 objects in Earth orbit and closely monitors some 800 maneuverable satellites for collision-risk assessment. Speaking Nov. 3 at the Strategic Space Symposium in Omaha, Neb., James said the goal is to increase the number of closely monitored satellites to 1,300 by the end of the year.

In addition, Buenneke said the State Department’s Office of Space and Advanced Technology is working closely with Strategic Command to facilitate notification of potential hazards to all spacefaring nations.

## PENTAGON EXPLORES SUPPLIER PROBLEMS

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Amy Butler [aviationweek.com](http://aviationweek.com)

23 February 2010

The Pentagon’s new industrial policy director, Brett Lambert, intends to recast the relationship between the Defense Dept. and industry to gain a better understanding of contractors and suppliers at all levels.

Meanwhile, defense officials are complaining about the quality of work from contractors just as the Pentagon is trying to revive a dormant dialogue with top CEOs over how to sustain the U.S. industrial base.

This leaves contractors in the position of receiving public blows from their defense customer (sometimes affecting their stock price) while at the same time asking the Pentagon for more support for their specialized skilled workers and facilities.

Senior government officials, including Defense Secretary Robert Gates, say they are concerned about industry’s performance. This includes poor quality of parts delivered, problems in hardware or software discovered during testing, and meeting projected schedules and costs.

It is unclear whether this performance problem is a symptom of a larger deficiency in the industrial base, which has atrophied in some areas since the Cold War. “I don’t know if you can demonstrate a connection,” says David Berteau, senior adviser at the Center for Strategic and International Studies (CSIS). But to repair these problems, there will have to be a close linkage between acquisition reform and industrial-base policy initiatives, he notes.

However, some of the problems in major weapon programs, including the Ground-based Interceptor (GBI) and several space programs, occurred because of deficiencies in parts delivered to prime contractors. This puts the entire supply chain squarely in Lambert’s focus.

Lambert says he wants more “insight, not oversight,” of the entire supply chain, including visibility into second- and third-tier suppliers. Oftentimes, they have only a six-month backlog, making them more volatile than the primes, which typically have about 2-3 years’ worth of work.

Lambert provided an example of a prime contractor, which he declined to name, that typically receives about \$5 billion in defense contracts annually. At least \$2 billion of that goes directly to subcontractors. But, Lambert says he lacks knowledge of the inner workings of these companies, including their quality control and financial stability.

Air Force Lt. Gen. (ret.) Henry (Trey) Obering, former Missile Defense Agency (MDA) director, says the second- and third-tier suppliers were a major focus area for him while in office from 2004-08. “The biggest area [of concern] wasn’t the prime. It was suppliers being managed by the primes.” When he began his work at the agency, Obering says he met with prime contractor CEOs once a quarter, and with each individually once a year. But he later expanded this to include second- and third-tier supplier CEOs. “You have to understand what is going on in your own backyard,” he notes.

As for Lambert, he is puzzled about why top Pentagon officials had stopped regular meetings with industry CEOs. However, this dialogue is being revived. Defense Secretary Robert Gates met with 15 industry CEOs last month.

Although some of the quality problems for the Pentagon occur at the subcontractor level, the primes are ultimately responsible under many contracts for the performance of those suppliers. Obering says he would use incentives and award fees to indicate clearly when a prime and its suppliers were not up to snuff.

Through acquisition reform, the Pentagon can address how to motivate industry to perform well on specific programs. And the Defense Dept. could also consider how to reform the Pentagon’s behavior on matters such as requirements discipline and fitful funding. Sometimes, the government is quick to point out problems with contractor performance, but often these issues are the product of a “mutual complicity” by both the government and industry regarding overly ambitious goals and “anemic funding” when embarking on a program, says Berteau.

However, sometimes there is no mutual acceptance of the blame when shifts in a program are requested by the Defense Dept., triggering delays or cost overruns. During a study last year, CSIS found that the government made major changes to the Littoral Combat Ship and the Marine One presidential helicopter replacement programs that were instrumental in industry’s inability to execute them as desired, says Berteau.

A close link is also needed between acquisition reform initiatives and industrial strategy and policy, says Jeff Bialos, a partner at Sutherland Asbill & Brennan and a former deputy undersecretary of Defense for industrial affairs.

The Pentagon is legally required to consider the ability of the industrial base to accomplish specific tasks in a program at each of its milestones, says Berteau. But there is no requirement to explore whether the industrial base is able to support the breadth of work planned by the Pentagon in the long term. So the net result is a seemingly fitful policy that is not tied to overall defense and economic goals.

“For every dollar we spend on programs and platforms we no longer require to address the threat, those are resources we are taking away from innovation and technology,” says Lambert. “What we need to do as a department is to better communicate to both industry and Capitol Hill where it is we are headed and what types of investment we need to make in manufacturing and in technologies.”

Yet, Lambert’s team is low on resources. As the Pentagon gutted its acquisition workforce in the 1990s, the industrial policy office also lost skilled analysts.

Although the office is often overwhelmed with “day-to-day” tasks, Lambert is trying to transform its focus to take on a long-range, strategic view of the industrial base. “The office of industrial policy

should be thinking ahead,” he says. “We should not be thinking about solving yesterday’s mistakes, but trying to address tomorrow’s problems.”

A set of criteria is needed to outline when “intervention” is needed by the Pentagon for a particular industrial sector, says Bill Greenwalt, former deputy undersecretary of Defense for industrial policy. After cutting off funding for the bomber industry last year, contractors argued that money was needed to keep highly skilled design teams in place. In the Fiscal 2011 spending request, \$200 million was set aside for those teams at Boeing/Lockheed Martin and Northrop Grumman, signaling that the Pentagon is willing to listen.

Another area needing immediate attention is the rocket-motor industrial base, which was dealt a blow by the cutback of GBIs and slashing of NASA’s Constellation human spaceflight program. Lambert’s office is preparing a report, to be delivered to Congress in June, on how to sustain this part of industry. This includes specialized facilities and workers who are familiar with the dangerous tasks of building solid-rocket motors and crafting the liquid-fueled engines (mainly the RS-68 for use by the Delta IV launch vehicle).

While orders for large Evolved Expendable Launch Vehicles (EELVs) from the Air Force have been reduced owing to delayed satellite programs, the Constellation termination cuts even further the demand for specialized work for the RS-68. The NASA move “changes everything. This is a game changer,” Lambert says. “We [the Pentagon] share an industrial base with NASA—on solids, liquids, range infrastructure and a workforce,” he notes. “So, with the cancellation of the Constellation program . . . we have got a lot of work to do with NASA to figure out how to maintain a minimum industrial base on liquid rocket engines and solid rocket motors.”

Gary Payton, deputy undersecretary of the Air Force for space, says that even before the Constellation termination, the per-unit price of Atlas V and Delta IV EELVs had been creeping upward—largely due to the rising cost of “piece parts” such as nozzles and avionics provided by second-and third-tier suppliers. Even with the savings produced by the United Launch Alliance joint venture (formed by Lockheed Martin and Boeing in 2006) to reduce overhead and manage two vehicle families, the overall pricing trend is going up. “The cost savings of combining the two companies into one are there, but it is being swamped by an increase in the cost of the piece-parts,” Payton says.

This trend is not unique to space systems; keeping a steady supply chain is essential in program stability across aerospace.

Payton says the industrial base supporting his satellite programs—which have been troubled by fitful funding, poor quality of parts and mismanagement by the government and contractors—is improving. But, the pace is slow.

## **DOD STUDYING ROCKET MOTOR SUSTAINMENT**

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Amy Butler [aviationweek.com](http://aviationweek.com)

8 February 2010

The Pentagon is participating in an interagency integrated team convened to explore how best to sustain the rocket motor industrial base — a mandate made all the more urgent given NASA’s planned cancellation of the Constellation program, according to Brett Lambert, the Defense Dept.’s industrial policy director.

Each of NASA’s Ares V launchers would have required six RS-68 engines, which are common to the U.S. Air Force’s Delta IV Evolved Expendable Launch Vehicle (EELV). Already, Air Force officials are seeing an uptick in the per-unit price of each EELV because procurement has slowed to keep pace with delayed satellite programs.



This trend is only getting worse with the NASA decision, according to Gary Payton, deputy under secretary of the Air Force for space. "We share an industrial base with NASA — on solids, liquids, range infrastructure and a workforce. So, with the cancellation of the Constellation program... we have got a lot of work to do with NASA to figure out how to maintain a minimum industrial base on liquid rocket engines and solid rocket motors," Payton told reporters Feb. 4 during a luncheon roundtable.

Lambert says the Pentagon is preparing a report on this issue that will go to Congress in June. The Constellation departure "changes everything. That is a game changer," he says.

Included in the team are representatives from the Defense Dept., the White House Office of the Science and Technology Policy and NASA, he adds.

While the report to Congress will lay out a strategy for sustaining the industrial base, largely occupied by Alliant Techsystems, a potential cost increase in the Delta IV is an ancillary possibility. Even before the effect of the Constellation decision is felt, cost pressure is already evident in EELV program despite the Boeing/Lockheed joint venture, United Launch Alliance, which was formed in 2006 to reduce overhead and streamline operations. The promise was cost savings. Payton says that piece parts — avionics, nozzles, engines — all are costing more because of the Air Force's reduced buy rate.

"The cost savings of combining the two companies into one are there, but it is being swamped by an increase in the cost of the piece part costs," Payton says.

## ENERGY DEPT TO CRAFT FIRST RARE EARTHS STRATEGIC PLAN

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John T. Bennett [defensenews.com](http://defensenews.com)

17 March 2010

The U.S. Department of Energy plans to construct its first strategic plan to guide Washington policy on rare earth minerals, a DoE official announced March 17.

"It's time we all pull together a real strategic vision on this," said David Sandalow, assistant energy secretary for policy and international affairs.

Sandalow said the DoE study will build on other rare earth analyses being conducted by the Pentagon and other federal entities.

DoD is working on several rare earth minerals studies, including one looking at rare earths in 24 weapons, and another to examine the national-security implications of China's dominance of the global supply. The DoD study of rare earths in U.S. weapons should be finished in September, said Rick Lowden from the Pentagon's industrial policy shop.

"DoD absolutely will be involved" in the Energy strategic plan, Sandalow said during a conference in Washington.

He said DoE has not yet established a timeline for fashioning the plan, but he vowed the department will move "with a sense of urgency."

Announcement of the strategic plan comes after U.S. mineral industry officials and advocates raised alarms that the Energy Department has done too little on the rare earths issue, and especially the nation's dependence on China for these minerals.

Mark Smith, CEO of Molycorp Minerals, called the announcement "the best news I've heard in a year and a half out of DoE."

The list of U.S. military gear that uses rare earths includes jet engines, unmanned aircraft, electric motors, radars, electronics, communications gear, night-vision goggles, missiles and more, according to DoD and industry officials.

## PENTAGON FOCUSING ON EARLY, REALISTIC TESTING

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Michael Fabey [aviationweek.com](http://aviationweek.com)

24 February 2010

The Pentagon's Director of Operational Test and Evaluation (DOT&E) is dialing up its efforts to ensure programs start with the right expectations and robust and realistic testing as soon as possible, according to the agency's recently released annual report.

"Fielding systems quickly and successfully depends critically on starting programs right and having sufficient, competent oversight," writes DOT&E Director J. Michael Gilmore, who took over the job last year.

Gilmore says he is reorganizing the DOT&E and shifting its priorities to make sure the agency can better enforce the Weapon System Acquisition Reform Act of 2009. "The Act recognizes that 'unrealistic performance expectations' and 'immature technologies' are among the root causes of trouble in defense programs," Gilmore says. "The test and evaluation community can, during the requirements-setting process, identify such potential problems early in the life of programs."

Gilmore said the agency will concentrate on four areas: field new capability rapidly; engage early to improve requirements; integrate developmental, live fire, and operational testing; and "substantially" improve suitability before initial operational test and evaluation. Gilmore says he has begun a systematic review of programs to assess whether there are remaining candidates for early fielding or accelerated testing.

He says he also is reviewing testing and evaluation procedures to see if they can be streamlined to better support rapid fielding and he wants to hone the "mechanisms" the agency has to provide feedback to program offices to assure that when testing indicates equipment has problems, the fix gets into theater quickly.

DOT&E staff members who assess programs are taking the following actions, Gilmore says, to ensure that systems have adequate requirements and are tested in realistic operational environments:

- Reviewing requirements as they are developed within the Joint Capabilities Integration and Development System to assure they are unambiguous, testable, operationally relevant, and technically realistic;
- Reviewing the Test and Evaluation Strategy (TES) and Test and Evaluation Master Plan (TEMP) for each project and working with developmental testers to assure that testing in operational environments is initiated during development and continues with increasing stress of the system through operational testing;
- Identifying operational concerns to Program Offices at the earliest possible time so that they can be resolved in a timely manner.

"There will always be a need for dedicated operational testing to confirm systems work in combat," Gilmore says.

"Nonetheless, the separateness of developmental testing from operational testing has caused problems in the development process that have been documented by the Defense Science Board and the National Academies," he says. "Most notably the lack of operational realism in early testing hides failure modes and limitations that then become evident only at the end of a program when fixing the problems is expensive, time-consuming, and, often, simply not possible. The solution is to introduce greater realism into testing earlier in order to understand those failure modes. I will move the department forward to integrate developmental, live fire, and operational test and evaluation."

## UK REPORT ARGUES FOR GROWTH SPACE

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Douglas Barrie [aviationweek.com](http://aviationweek.com)

10 February 2010

British industry, academia and government are setting out a highly ambitious vision to radically increase the size of the nation's space sector at the heart of a 20-year plan.

The Space Innovation and Growth Team (IGT) report, made public Feb. 10 in the U.K., calls for an overhaul of how London approaches the space sector, with increased government funding and greater coordination.

The IGT's intent was to create a template that will develop a market worth £40 billion (\$62.7 billion) by 2030 — in effect a sixfold increase in the value of the U.K.'s space sector.

The report argues for a doubling of national funding for space over the next decade, including increased support for research and development. New funding for the proposed national research and development program would start at £20 million in 2011, increasing to £100 million by 2015.

The IGT report recommends the government "define and implement a National Space Policy" bringing together "all public sector requirements and funding for services that can cost-effectively be delivered by space."

Central to delivering the lofty ambitions will be the U.K. Executive Space Agency, which is to replace the British National Space Council.

The report recommends that the agency "be responsible for the administration of a national space budget," with its remit covering the "civil, defense, and security space domains."

## RUSSIA MUST BOOST SPACE DEFENSES

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Agence France-Presse source: [defensenews.com](http://defensenews.com)

17 February 2010

Russia must improve its space defenses as well as modernize its nuclear arsenal by 2020, Prime Minister Vladimir Putin said in comments released Feb. 17.

"In accordance with the plan for the development and reconfiguration of the armed forces, special attention, of course, will be paid to nuclear deterrent forces, space and air defenses," he said.

Putin made the comments at a meeting late Feb. 16 devoted to implementing an ambitious Kremlin plan to rearm Russia's military between 2011 and 2020, according to a statement on the government's Web site.

Putin also said the military should have high-tech communications equipment and that Russia should finish building a fifth-generation fighter jet.

## COMMENTARY

### **DOD'S RELIANCE ON COMMERCIAL SATELLITES**

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[defensesystems.com](http://defensesystems.com)

25 February 2010

The U.S. military is increasingly turning to the private sector for many of the services it relies on. After the supply of energy and terrestrial fiber communications, satellite communications is the top capability that the U.S. military relies on the private sector to deliver.

Industry experts estimate that 80 percent of all satellite bandwidth that the Defense Department uses is purchased by the Defense Information Systems Agency from companies such as Inmarsat, Intelsat and Iridium. That percentage is expected to climb north of 90 percent in the near future as unmanned aerial vehicles and other intelligence, surveillance and reconnaissance (ISR) systems begin transmitting in high definition, which will require even more bandwidth.

New satellite constellations, such as the Mobile User Objective System (MUOS), are expected to take up some of the slack. However, the need for supplemental bandwidth is expected to continue growing during the time that the five MUOS satellites are put into orbit between 2010 and 2015.

DOD leaders might have legitimate concerns about the department's dependence on the private sector for such a vital tactical capability. However, it's a burden the military is perfectly happy to place on the shoulders of industry.

"At the end of the day, it's a great thing," said Gen. James Cartwright, vice chairman of the Joint Chiefs of Staff, responding to a question about whether the military's dependence on commercial bandwidth is good, bad or unimportant.

"As we move to more exquisite sensors, the demand for high-definition video is substantially greater, so we have to move to mediums and compression algorithms that will allow us to do that," he said after remarks he made during an AFCEA International conference in San Diego in February. "The good news is that the industry is leading that. I don't have to go invent it."

The military gains another advantage because private companies constantly update and refresh their satellites to stay competitive in the commercial market, Cartwright said. Using private-sector bandwidth breaks the DOD satellite procurement cycles that regularly stretch out over a decade.

#### Narrowband to the Foxhole

Even with the recent launches of three Wideband Global Satcom satellites, colloquially known as the gap filler satellites, DOD's system of satellites is made up mostly of aged and degrading ultra-high-frequency satellites, operated under a variety of military satellite communications (milsatcom) programs, such as the UHF Follow-On (UFO) satellite network. Although the WGS satellites close some of the gap between warfighter needs and deficiencies, they are designed mostly to be the big pipes through which combatant commanders bring forth ISR capabilities. However, they don't play much of a role in providing situational awareness to warfighters in the field.

As a result, the shortfall in bandwidth is felt most urgently by troops who are highly mobile and don't have the luxury to access a fiber-optic network or large, stationary satellite terminals. The requirement for narrowband to the foxhole outstrips the capabilities and available throughput of DOD's UHF satellite network.

"Tactical communications in narrowband is one of the areas that is so significantly broken right now," said Rebecca Cowen-Hirsch, president of Inmarsat Government Services, who, before joining Inmarsat in late 2008, was program executive officer for DISA's PEO-Satcom, Teleport and Services (PEO-STs).

“For every one request for UHF capacity [that's accepted], five are denied,” she said. “Milsatcom is 500 percent oversubscribed. Communications on these narrowband frequencies are crucial to life or death, but the DOD is having significant difficulties maintaining this capacity because the UHF constellation on orbit today is fading.”

DOD is building the MUOS network of satellites to address that need for delivering narrowband, beyond-line-of-site connectivity at speeds of 64 kilobits/sec or slower to the foxhole through devices such as the handheld radios in development under the Joint Tactical Radio System program. But the first of four MUOS satellites — plus one on-orbit spare — is not scheduled for launch until later this year, and DOD does not expect to reach full operational capability until 2014. Meanwhile, the growing need for narrowband communications — especially as operations in Afghanistan continue to escalate — will go largely unfilled.

And even then, “not to take away from what MUOS will provide — because it is a fantastic capability when it comes on orbit — but when it does go on orbit, its third-generation capability will not yet be able to be accessed because the terminals are behind” schedule, Cowen-Hirsh said.

### Plugging the Gap

The commercial satellite industry has grown significantly in recent years by bridging many of the military's satellite communications gaps, notably by providing a variety of portable broadband global-area network (BGAN) terminals that can access Inmarsat's I4 network of satellites.

For instance, at the AFCEA West conference and trade show, at least a dozen companies displayed BGAN solutions, including Harris, Hughes, EMS Technologies, Addvalue Technologies and Thrane & Thrane, that give warfighters encrypted and secure access to the Global Information Grid as a complement to existing UHF capability.

“The biggest single problem that the DOD has is that it doesn't have enough bandwidth, which is a bad thing because we're fighting wars on two fronts,” said William Beamish, director of product line management for Harris' Falcon III Manpack radios, which interface with BGAN terminals. The radios provide data rates of 432 kilobits/sec for land portable communications and 492 kilobits/sec for on-the-move/at-the-quick-halt land mobile communications via Inmarsat satellites.

BGAN services are used primarily for IP-based data connectivity for e-mail, Internet and virtual private network access, though it also supports simultaneous voice capability. Besides connectivity, the main value of the BGAN capabilities is that the land-portable terminals are no larger than the ruggedized laptops they plug in to. Similarly, vehicle-mounted land-mobile BGAN terminals for on-the-move communications are half the size of the rooftop terminals in development as part of the Warfighter Information Network-Tactical program.

If BGAN technology survives after the introduction of new satellite networks such as WGS and MUOS, industry experts believe it will be because of the small size of the terminals.

“X-band comms-on-the-move units are as large as one-yard cubed, and they need to be installed on something the size of a pickup truck,” Beamish said. “For that reason, we expect that BGAN will continue to be a viable service for a time.”

### Vital yet Ad Hoc

Part of the challenge to closing the communications gap stems from the ad hoc way the military buys commercial satellite bandwidth.

The military typically buys satellite bandwidth in one of two ways. One way involves procuring an IP network in which users pay for the bandwidth they use. The other way is to lease bandwidth so that users are assigned dedicated bandwidth in which capacity is exclusively theirs to use.

Either way, the military acquires most of its bandwidth from the private sector on an ad hoc basis. Industry estimates suggest that more than 95 percent of the commercial bandwidth acquired is paid for via supplemental funding, instead of being a line item in each service's annual budget.

The Navy is the only service that funds and has budget line authority for commercial satellite communications. That's because Navy officials recognized a long time ago that being disconnected while operating at sea would make it harder to compete for milsatcom. As a result, the Navy saw the value of turning to commercial satellite communications and made the strategic decision to budget for it.

Commercial satellite communications providers welcome the business they receive from DOD. However, industry executives say they believe they could better serve the military through upgrades and development of new capacity if their businesses had some cost assurance.

"The commercial satellite capability that we're providing the military user is not something that is intentionally planned for by the DOD," Cowen-Hirsch said. "Commercial SATCOM was originally viewed as an augmentation. Now it is an integrated capability. And yet from programmatic and funding standpoints, the DOD has not put a framework around it as such that when users, especially those in the tactical communications environment, deploy on their missions, they have no absolute assurance that someone's going to take care of all the necessary capability requirements, whether it is military or commercial satellite communications."

"Going forward, that is really not a winning proposition in that commercial SATCOM is not an integrated part of the architecture, is not funded intentionally and doesn't happen with forethought to ensure that it is there," she said. "We want to make sure that there is a sufficient business case for the investment we make to meet the requirements of the user base ... and the warfighter."

That's a message that seems to be getting through to the military based on changes in DOD vernacular, which has evolved from calling satellite communications a surge capacity after the 2001 terrorist attacks to calling it an augmentation and now referring to it as integral.

It's now common to hear conversations center around commercial satellite communications as a core capability, as Cartwright describes it. Such a change in philosophy is not a surprise after Central Command officers, such as former Brig. Gen. Mark Bowman, have publicly said 96 percent of satellite communications in the Centcom area of responsibility comes from the commercial sector while only 4 percent comes from milsatcom.

"The DOD is coming to the realization now that as they become more dependent on commercial services that perhaps they need to work closer with the commercial industry to ensure that their requirements are met by commercial systems," said J.J. Shaw, director of North American and global naval programs at Inmarsat. Shaw is a former Navy commander who managed the Navy's Challenge Athena program to acquire commercial satellite communications services for carrier battle groups. "For instance, if Inmarsat were to build a satellite system, the DOD would like to make sure we're using encrypted telemetry, tracking and control so we have positive control of our satellites."

"The paradigm has shifted from commercial SATCOM being surge augmentation to being core," Shaw said. "It has changed [the military's] perspective to the point where they realize they need to work with the commercial industry to ensure that their requirements are met."

One of those requirements would be make satellite terminals more mobile so warfighters could carry them in briefcases or backpacks. Another would be to embed communications deeper into the force structure.

Using the Navy as an example, satellite services during the past 15 years have been primarily the purview of surface vessels, such as guided missile destroyers. Most recently, satellite communications capabilities are being integrated into lower tactical echelons, such as patrol boats. The next step will be to embed that capability into the subtactical level in things like unattended sensors on buoys for the Navy and unattended ground sensors for the Army.



## DISA and GSA Step In

In the short term, all eyes in the commercial satellite communications industry will be on the Future Comsatcom Services Acquisition (FCSA) contract, a joint effort by DISA and the General Services Administration through which they will buy all commercial satellite communications services and capabilities for the next decade under a common marketplace. Under FCSA, DISA and GSA expect to spend \$5 billion for satellite services in any commercially available commercial satellite communications frequency band, including L, S, C, X, Ku, extended Ku, Ka and UHF.

FCSA is the follow-on contract to the contract vehicle that is used to procure commercial satellite communications, which is called the Defense Information System Network (DISN) Satellite Transmission Service-Global (DSTS-G) contract. It went into effect in February 2001 and will expire in February 2011.

Under DSTS-G, three companies — CapRock Communications, DRS Technologies and Artel — won the rights to obtain global fixed satellite service bandwidth and related business and enterprise satellite-based services and applications. Those three companies in turn then go to the marketplace to seek satellite bandwidth from companies such as Intelsat.

With FCSA, satellite communications companies want access to DOD contracts without needing to go through one of those three companies.

“One of our critical initiatives is to get access to FCSA so we can continue to serve DOD with the types of products and services that they need,” said Britt Lewis, vice president of business strategy at Intelsat.

FCSA will address three broad categories of commercial satellite communications access. The first is the procurement of conventional satellite bandwidth. The second is known as subscription services, in which a user buys or leases a satellite terminal and can then purchase satellite services through a distributor. The third is end-to-end services, in which a customer defines requirements and a vendor identifies everything from the satellite, teleport and terrestrial connectivity to the antennas, installation/operation/maintenance of the network, and monitoring and control for situational awareness.

However, FCSA represents a short-term acquisition fix to what many believe needs to be a more explicit strategic commitment by DOD to the commercial satellite communications industry upon which the military relies.

## **THE TRAVAILS OF JOINT RADIOS**

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*By Bob Brewin [whatsbrewin.nextgov.com](http://whatsbrewin.nextgov.com)*

*10 March 2010*

The Joint Tactical Radio System, in development since 1999 when I only had a few gray hairs, failed another series of tests last year at Fort Bliss, Texas.

Dr. J. Michael Gilmore, the Defense Department's director of operational test and evaluation, told a hearing of the House Armed Services Committee on Wednesday that an April 2009 test of the Rifleman Radio, planned for use by grunts, highlighted deficiencies in reliability, battery life and range.

The JTRS Ground Mobile Radio, planned for use in vehicles, had yet another slip in development testing because of hardware and software problems, Gilmore said.

A test of the wideband version of the Ground Mobile Radio showed it had low throughput and the National Security Agency also identified security issues with it, he said.

Since the Army plans to use these radios in its future highly networked force, maybe it's finally time to give up on the grand JTRS vision to develop a family of software-defined radios for all the services and just buy a pile of plain vanilla radios.

## SAT-NAV SYSTEMS UNDER INCREASING THREAT FROM 'JAMMERS'

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Jason Palmer [news.bbc.co.uk](http://news.bbc.co.uk)

23 February 2010

While "jamming" sat-nav equipment with noise signals is on the rise, more sophisticated methods allow hackers to program what receivers display.

At risk are not only sat-nav users, but also critical national infrastructure.

A UK meeting outlining the risks was held at the National Physical Laboratory in Teddington on Tuesday.

"GPS gives us transportation, distribution industry, 'just-in-time' manufacturing, emergency services operations - even mining, road building and farming, all these and a zillion more," David Last, a consultant engineer and former president of the Royal Institute of Navigation, told the conference.

"But what few people outside this community recognise is the high-precision timing that GPS provides to keep our telephone networks, the internet, banking transactions and even our power grid online."

Professor Last recalled the New Year's Day failure of a single satellite in 2004 and how it wreaked havoc with sat-nav readings.

"Satellite failures, though dramatic, are not the main problem," he said.

"The Achilles heel of GPS is the extremely weak signals that reach the receiver."

Each satellite in a sat-nav constellation is putting out less power than a car headlight, illuminating more than a third of the Earth's surface at a distance of about 25,000 km.

What that means, and what has brought this group of policy-makers, academics and industry figures together, is that the signals can be easily swamped by equipment back on Earth.

### Criminal intent

This can be done unintentionally by, for example, pirate television stations, or with a purpose in mind.

Military systems have been doing this "jamming" - flooding an area with a signal at the GPS frequency - for years in a bid to frustrate enemy navigation systems.

But small jamming devices are increasingly available on the internet.

Low-power, hand-held versions can run for hours on a battery and confuse sat-nav receivers tens of kilometres away.

Higher-power versions can do far worse, and at both GPS and mobile phone frequencies.

What is more, receivers can be "spoofed" - not simply blinded by a strong, noisy signal, but fooled into thinking their location or the time is different because of fraudulent broadcast GPS signals.

"You can now buy a low-cost simulator and link it to Google Earth, put on a route and it will simulate that route to the timing that you specify," said Professor Last.

"A GPS receiver overcome by it will behave as if you're travelling along that route."

The approach still costs in the thousands and is the preserve of what Professor Last calls the "real techies", but he guessed that the tools could be in the hands of criminals within a year or two.

One obvious reason to do the jamming or spoofing is that high-value cargo is tracked with GPS, as are armoured cars and many rental cars, so that confusing the tracking signal could spell a successful heist.

Sat-nav-based pricing for toll roads and road usage charges could be spoofed, and a company's employees may even use the devices to block the tracking devices imposed on company cars.

But jamming and spoofing, Professor Last said, were irresistible to the hacker type who did it for fun.

"You can consider GPS a little like computers before the first virus - if I had stood here before then and cried about the risks, you would've asked 'why would anyone bother?'."

"It's the same market as the hackers."

But the hackers' fun poses a particular danger to ships, which have systems that increasingly use sat-nav directly but also feed GPS signals into other equipment.

Some at the conference argued that with the growing maritime use of sat-nav, crews were less able to revert to classic methods of map-reading and "dead reckoning".

Alan Grant of the General Lighthouse Authorities carried out an experiment in 2008 to assess the degree to which ships would be affected by a jamming signal.

Using a relatively low-power jamming signal off the eastern English coast, he found that ships coming into the jamming area suddenly read locations anywhere from Ireland to Scandinavia - but with ranges depended on the ship itself.

"The level of disruption depends on the ship - the make and model of the kit, how it's been integrated, and down to the strength of the jamming signal," he said.

But he suggested the more dangerous case is that of a jamming signal causing only small errors that would not so obviously give themselves up as false information.

The immediate solution to the problem is not clear, since the existing US GPS and Russian Glonass systems, and the forthcoming European sat-nav effort Galileo, are equally susceptible.

Some at the conference suggested the relative security of the eLoran ground-based system that is already in place, but which existing consumer devices do not pick up.

There is no reason to believe, however, that widespread adoption of eLoran or any other standard would preclude eventual jamming efforts to thwart it.

"Navigation is no longer about how to measure where you are accurately - that's easy," Professor Last said. "Now it's all about how to do so reliably, safely and robustly."

## **DOES NASA HAVE AN INTERNATIONAL FUTURE?**

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*Taylor Dinerman [thespacereview.com](http://thespacereview.com)*

*8 March 2010*

As long as NASA cannot maintain a serious large-scale program that can last more than one administration, it is hard to see how it can be taken seriously as a solid long-term partner by foreign space agencies. The US has a mixed record of sticking to its international space commitments. The International Space Station (ISS) program is a shining example of the US taking a decision to lead a partnership and then doing just about everything it could to insure the success of the effort.

Ever since Bill Clinton turned Ronald Reagan's Space Station Freedom program into the ISS in 1993, the program has thrived in spite of its many critics and in the face of costly delays and the aftermath of the Columbia disaster. It exists today and it is a marvelous example of what America can do when it wants to. The international partners have performed well, but without the US the thing never would have been built.

In contrast, in 2002 NASA administrator Sean O’Keefe canceled the Crew Return Vehicle (CRV) development program due to what he said were budget problems. Germany had invested considerable time and money to design a nose cone for the CRV, and this investment was lost.

Yet the CRV fiasco was a minor glitch compared to the 1981 cancellation of the US-European International Solar Polar Mission (ISPM). This was one of the most ambitious heliophysics missions ever proposed. In the first months of the Reagan administration, budget cuts forced NASA to cancel either the space telescope, the Galileo Jupiter mission, or the ISPM. The Europeans vigorously protested the cancellation: they had assumed that the US would follow their tradition, which was (and is) to never cancel any international program no matter how much stress this puts on purely national programs.

Since then the European Space Agency (ESA) and NASA have successfully cooperated on several solar physics missions, including the long running SOHO probe and now the potentially spectacular Solar Dynamics Observatory (SDO) spacecraft launched last month. Yet even after thirty years, ESA has not forgotten, or forgiven, what happened to the ISPM.

Another European disappointment was the Spacelab module, which flew far fewer missions than ESA had hoped. At least that program led the way for Italy to become proficient at building space structures. The science work that had been planned had to be abandoned, leaving NASA with yet another blot on its international record.

The US has a fundamental problem with the way it designs and builds long-term civilian science and technology programs. It is simply too easy for an administration to propose a new project, if Congress agrees to get funding. But there is nothing that obliges any future administration to continue any particular program. Even worse, there is no sense among politicians or civil servants that once a program has begun it is wise to finish it. A nation with a reputation for never finishing what it starts will find few genuine partners for any of its major projects.

One of the worst examples of this was the cancellation in 1993 of the Superconducting Super Collider, a giant particle physics project that was voted down by a Congress anxious to deal a blow to what was then known as “Big Science”. Since then America’s standing in this branch of science has fallen from a place of indisputable leadership to one of parity with Europe and Japan. CERN in Geneva is world’s premier center for this research and the technological benefits that go along with it have long been lost.

Though the problem may appear to be political, it might be a good idea to look at the structural roots of this phenomenon. The US has never been able to put together a “Capital Improvement Budget”. The Pentagon can occasionally put together a multi-year program, but they are generally restricted to items that have been in production for many years and whose cost structure is well understood by the procurement bureaucracy and industry. Ambitious science and technology projects fall well outside this category.

The negative reaction by some in Congress to the proposed cancellation of the Constellation program could be seen as an opportunity for the US legislature to rethink the way it funds these big long-term programs. It should not be beyond the ability of Congress to pass a budget law designating certain programs as “settled” and immunizing them from the normal year-to-year political flux. The fact that such programs would deprive Congress of its ability to fine-tune annual policy would insure that these programs would be rare indeed and would have to be especially valuable.

Such a change in the system would, over the long term, make the US a leading partner in global science and technology projects, not only due to the excellence of our researchers and the size of our budgets, but due to America’s reliability. Otherwise we will continue to be seen as a dangerous and unstable ally, liable to quit any project with the slightest shift in the political winds.

## SPACE TO THRIVE

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[economist.com](http://economist.com)

3 February 2010

In 2004 George Bush announced a plan for America's space agency, NASA, to return to the moon by 2020, land there, explore the surface and set up a base. The moon would then serve as a staging post for a journey to Mars. It was, unfortunately, unclear how this modest proposal would be paid for and, as work began and costs spiralled, the "vision" seemed more science fiction than science.

On February 1st, reality caught up. The back-to-the-moon programme, Constellation, with its Ares rocket (pictured), fell victim to Barack Obama's need to find cuts. The Office of Management and Budget described it as over budget, behind schedule and lacking in innovation due to a failure to invest. The office also said Constellation had sucked money from other, more scientific programmes, such as robotic space exploration and Earth observation.

Much has been made of the fact that NASA will, as a consequence of Constellation's cancellation, have to rely on private firms to send its astronauts to the international space station once the space shuttle is withdrawn. In many ways, though, this is the least interesting aspect of what is happening, for what Mr Obama proposed is actually a radical overhaul of the agency.

### Success is an option

The rethink looks at four areas: new ways of getting into space; extending the life and use of the space station; the agency's relationship with the private sector; and its scientific mission. The first part of the plan, known as the transformative technology initiative, will cost \$7.8 billion over five years. It will develop orbiting fuel depots, rendezvous-and-docking technologies, advanced life-support systems that recycle all of their materials, and better motors for spacecraft. The agency will also develop new engines, propellants and materials as part of a \$3.1 billion heavy-lift programme, to allow it to send craft well beyond Earth, while \$4.9 billion is allowed for advances in areas such as sensors, communications and robotics.

The second part of the plan is to postpone the death of the space station from 2016 to 2020. More science will be done there (cynics might take issue with the word "more") and there will, specifically, be research into biology, combustion and materials science. There will also be more emphasis on space medicine, and the station is to get a centrifuge. This will allow people to experience artificial gravity in space, which may be important for long-term missions to places such as Mars. Inflatable "space habitats" were mentioned, and these might be used to build extensions to the space station on the cheap. All this will please the station's other participants—Canada, Europe and Japan—which have invested a lot in it for, as yet, little return. It will also help build a coalition of countries that want to travel farther into the solar system.

Now Constellation is cancelled, the plan's third part is to encourage private firms to provide transport to and from the space station. Such journeys into low Earth orbit do not need the heavy-lifting oomph that more wide-ranging missions require, so the proposal is to contract out all of this local delivery work. In fact, such a scheme already exists, and 20 cargo missions by two firms, SpaceX and Orbital Sciences, are planned. The scheme will be extended to include at least two other companies, Boeing and Sierra Nevada Corporation.

Under the new regime, companies will get fixed-price contracts instead of being paid on a "cost plus" basis. The risks and burdens of developing transport to low Earth orbit will thus fall to the private sector. According to Mike Gold of Bigelow Aerospace, a firm that hopes to build inflatable space habitats, such fiscal rectitude has been met with criticism from a surprising quarter: Republican politicians. Bill Posey, who represents Florida in Congress, described it as a "slow death of our nation's human space-flight programme". "If you could fuel a rocket on hypocrisy," Mr Gold suggests, "we'd be on Pluto by now."

The last part of the plan is for more science. The Earth-observation programme will receive some \$2 billion to improve the forecasting of climate change and monitor the planet's carbon cycle and its ice sheets. As part of this, NASA will replace the Orbiting Carbon Observatory, a satellite that was lost a year ago, and which was supposed to identify the world's sources, and sinks, of carbon dioxide.

There will also be a new emphasis on robotic missions, which are vastly cheaper than manned ones, and cause less angst if they blow up. The first robot destination will be the moon. There will also, according to Charlie Bolden, NASA's administrator, be a mission to the sun, to study the solar wind, and one to improve the agency's ability to detect and catalogue interesting (but potentially dangerous) asteroids that pass near Earth.

It all, then, adds up to a radical shift—but a sensible one after years of fantasy. As Lori Garver, Mr Bolden's deputy, put it, "the old plans lost us the moon. This gives us back the solar system."

## THE PRIVATE SPACE RACE TAKES OFF

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[latimes.com](http://latimes.com)

30 January 2010

Within the next decade, the stereotypical space traveler may no longer be a square-jawed fighter pilot but a wealthy Internet geek with deep pockets.

Or at least that's what a crop of gutsy space entrepreneurs hope.

For half a century, venturing into space has been the primary domain of governments that can afford to spend billions of dollars to develop and send massive rockets into orbit. But modern-day industrialists believe a privately funded commercial space industry is poised to blast off.

With technological advances that they say will make rocketry more affordable, companies are popping up nationwide and focusing on an array of ventures, from lifting "space tourists" briefly into orbit to launching satellites and cargo far into space.

"It's a pivotal time in human evolution," said Peter H. Diamandis, chief executive of the X Prize Foundation, a nonprofit group that sponsored a \$10-million competition to develop a private manned rocket. "Within the next few years, companies will open space to the masses, as opposed to the few. With that change brings a tectonic shift in the way we as human beings live."

In 2004, a team led by Burt Rutan, a maverick Mojave Desert aerospace engineer, won the \$10-million purse by sending a test pilot to the edge of space, where humans can feel weightlessness.

The private space race was officially on.

Diamandis takes pride in starting the mad dash. After all, it was his goal. He knew people weren't going to invest in private space unless there was an incentive.

That's when he thought of the Spirit of St. Louis.

"People don't remember this, but the Spirit of St. Louis came as a result of a contest," Diamandis said of the airplane in which Charles Lindbergh made the first nonstop flight between New York and Paris. The 1927 feat won Lindbergh a \$25,000 prize. "That's what we needed in our industry."

Diamandis, a physician by trade, is like many in the private space field. He's a baby boomer with a zeal for science fiction and a lifelong desire to be an astronaut. The walls of his Playa Vista office are cluttered with photos and memorabilia. Star Trek trinkets are stacked high, along with Yoda toys and Buzz Aldrin-inspired G.I. Joe action figures.

"I grew up in an era when flights into space were routine," he said. "We've lost that over the years. And that's why we need individuals to step in."

Aiming high



Rutan's prizewinning spacecraft, SpaceShipOne, caught the eye of British billionaire Richard Branson, founder of Virgin Atlantic Airways.

Known as a maverick himself, Branson wanted to work with Rutan on a much bigger rocket that could send not only a pilot into space but fare-paying passengers as well. Rutan began working on the project in the Mojave Desert with his company, Scaled Composites.

The enterprise was shrouded in secrecy for years. Then in 2007, during a test of the spaceship's propulsion system, an explosion killed three workers and injured three others.

The blast uncovered the secret project and cast a glaring light on the inherent risks of rocketry. Rocket development, even backed with government resources and financing, has been fraught with disappointments.

Despite the accident, Branson and Rutan continued the project. Last month they unveiled their new rocket, dubbed SpaceShipTwo, and its carrier aircraft, VMS Eve, at an airport in the Mojave Desert.

Rutan had come up with a novel idea: Instead of trying to launch a rocket directly into space, the carrier craft, which resembles a flying catamaran, would lift SpaceShipTwo to an altitude of 50,000 feet. At that point, SpaceShipTwo -- carrying six paying passengers and two pilots -- would separate and blast off to about 325,000 feet, or 60 miles, above the Earth's surface.

At that suborbital altitude, passengers experience weightlessness and see the curvature of the Earth. The price for the experience: \$200,000.

Virgin Galactic, the space travel company that Branson created to operate the flights, has taken reservations and deposits from 300 people. Virgin Galactic hopes to make its first passenger flight from a "spaceport" in New Mexico by 2011.

To Sheila Kessler, 65, of San Clemente, the endeavor is an opportunity to live out her dream of becoming an astronaut. Kessler, who owns a business coaching corporate executives, put down a \$100,000 deposit to be a passenger.

As a young woman in the 1960s, Kessler applied to be a NASA astronaut. She made it through the first two rounds of cuts -- government officials even interviewed her neighbors to get security background on her, she said. But in the end, she didn't make it.

"I knew I was being rather ambitious to apply, especially at that time," she said. "Of course, I was disappointed. But here we are all these years later and I have an opportunity again."

### A young industry

Other privately funded companies are hoping to make a run at carrying cargo into space. XCOR Aerospace Inc., another Mojave-based company, agreed last year to lease one of its forthcoming suborbital space planes to a South Korean aerospace research organization in a deal worth about \$28 million. The organization plans to use the vehicle to send South Koreans into space and to conduct environmental research.

The deal was a sign that money could be made from commercial space travel.

"The private space travel industry is really still in its infancy stages," said John Spencer, president of the Space Tourism Society in Los Angeles. "But I believe that by the end of this next decade we'll see thousands of people being sent to space."

That's a pretty heady prediction, considering that only about 500 astronauts have been launched into the cosmos since space travel began in the 1960s. Only seven of those were private individuals. The vast majority were U.S. or Russian government-trained astronauts.

Space Adventures, a Vienna, Va., company, has organized trips to the International Space Station for space enthusiasts who could afford a ticket for a seat in a three-person Soyuz rocket owned by the

Russian government. Its first client was Dennis A. Tito, a California multimillionaire who founded Wilshire Associates Inc., an investment firm in Santa Monica.

In 2001, Tito was the world's first official space tourist, shelling out \$20 million for the ride.

Tito, who was 60 at the time, spent eight days at the International Space Station with two cosmonauts. It was the fulfillment of a childhood dream, he said.

Tito was trained as an aerospace engineer and worked at NASA's Jet Propulsion Laboratory in La Cañada Flintridge before starting his investment firm, which represents more than \$8 trillion in assets.

"The instant I was in outer space, I achieved my life's goal," he said. "Everybody should experience what I experienced."

Since his flight, Tito said, he's been impressed with the progress in the commercial space industry. He calls it the "big new industry for the 21st century."

"As long as people are adventurous and have a healthy human curiosity, the commercial human space industry will thrive," he said.

While space tourism has grabbed the headlines, the private space industry has been eyeing another potentially lucrative business that could open up with the last flight of NASA's space shuttle, scheduled for this year.

When the shuttle program is mothballed, the U.S. will have no way to travel to the International Space Station other than to take a ride on a Russian Soyuz rocket. Russia charges NASA \$51 million to carry an astronaut to the space station.

Analysts say ferrying cargo and astronauts to space could be a profitable venture. But for many entrepreneurs, developing rockets is more about fulfilling a lifelong dream.

"If you're in this industry, you have to be motivated by more than just money," Diamandis said.

'Inflection point'

Typical space entrepreneurs are known risk-takers and unconventional thinkers who amassed fortunes in other industries. And they have always had a fascination with space.

Elon Musk, a 38-year-old who made a fortune when he sold online payment business PayPal Inc. in 2002, started a company that hopes to develop and launch rockets that can carry satellites into space at a fraction of the cost of the current generation of spacecraft.

Musk's Space Exploration Technologies Corp., or SpaceX, has won a \$1.6-billion NASA contract for 12 flights to transport cargo, a role the space shuttle now fills. The rocket that will power the missions, the Falcon 9, is expected to make its inaugural flight sometime this year.

"We're at a historic inflection point," Musk said, noting that the U.S. space agency is increasingly focusing on deep-space exploration. "NASA has essentially given up low-Earth orbit. It's important that we can fill their shoes and succeed."

He knows that if SpaceX falls short, it could send tremors through the privately funded commercial space industry.

Musk envisions eventually developing a craft that could take astronauts as well as supplies to the International Space Station, a feat that so far has been the domain of U.S. and Russian space programs.

Other wealthy entrepreneurs are also following their lifelong pursuit of space travel.

Robert Bigelow, founder of the Budget Suites of America hotel chain, has built and launched prototypes of inflatable modules that could serve as orbital hotels and research labs. And Amazon.com Inc. founder Jeff Bezos is building a spacecraft that, like Virgin Galactic's, is designed to take passengers into suborbital space.

Several firms are eyeing another area of space travel: developing vehicles that can land on the moon. Masten Space Systems Inc. of Mojave and Armadillo Aerospace of Rockwall, Texas, recently won a contest sponsored by Century City-based Northrop Grumman Corp. to build a lunar lander.

The two winning companies each flew their lunar lander rocket vehicles twice in two hours, hovering between a pair of landing pads for at least 180 seconds, to qualify for the \$1-million top prize.

Diamandis of X Prize believes that private industry shouldn't stop at the moon. For one thing, he said, there are endless resources of minerals and rare-earth elements that can be extracted from asteroids and other planets.

"Our destiny as human beings is to explore," Diamandis added. "Now the individual has the power that a government once had."

## **U.S. LAST IN COMBAT GEAR OUTPUT PER SPENT DOLLAR**

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*John T. Bennett [defensenews.com](http://defensenews.com)*

*15 Mar 2010*

The United States scored last in a new study that examined how 33 major militaries spend funds on weapon systems - while potential U.S. rival Russia ranked third.

In a study due out March 15, consulting firm McKinsey & Co. examined how efficiently 33 nations that account for 90 percent of worldwide defense expenditures perform a range of functions. The study looked at how these militaries go about doing certain tasks in three key areas: personnel, maintenance and weapon buying.

"In general, countries that make it a point to support their domestic defense industries have higher procurement costs than those that rely on imports. Countries that procure older equipment from the global market tend to have very capable fleets for less money," according to the report.

"The United States and Australia are the lowest performing countries with regard to equipment output for every dollar spent," McKinsey concludes.

Washington and its Down Under ally both tallied scores of 17, worst among the 33 nations McKinsey examined.

Brazil gets the most military output per dollar spent, racking up a study-best 330 points, followed by Poland's 287 and Russia's 253.

The average score was 100 points, according to the report, which will be published as a special defense issue of the firm's "McKinsey On Government" publication, which focuses on government management practices.

John Dowdy, head of defense and security for McKinsey, said there is no question, however, which nation's military brings the biggest punch to any given fight: the United States.

"The American military is very high quality, but that comes at a very high cost," he said.

Although the report awarded points for most efficient practices in several areas, including procurement, its chief authors said no one nation can be branded as most efficient.

"Studies have found, in education, Singapore and Finland are the best across the board," Dowdy said. "I'm afraid in defense, there are no Singapores or Finlands."

### **Best Practices**

"There are pockets of best practices that we have identified," Dowdy said. For instance, one nation may be doing tank maintenance the best but has a way to go on helicopter training.

The goal of the study, he said, was identifying best practices that nations can apply in areas where they may be wasting money with inefficiencies.

McKinsey researchers conducted the study by analyzing publicly available records "on the quantity and type of military equipment, number and general classification of personnel, annual defense budgets disaggregated into key spending categories," the report states. Data was then converted into a series of ratios that measured actual outputs in the three areas.

The McKinsey study also determined that militaries that do things across their various armed services scored higher.

Within the 33-military sample, the highest level of "joint spending" was 68 percent (South Africa) and the lowest was 3 percent (Brazil, Portugal and Greece).

The United States ranked toward the low end on a chart in the report, with 16 percent joint spending. France, Taiwan and Australia were all midpack, with about 30 percent.

"Not surprisingly, we found that countries that share more functions across the armed services tend to be more efficient," the report said.

### Tooth-to-Tail

On personnel, the study examined the nations' so-called tooth-to-tail ratios. The tooth is defined as the military strength "in the front lines." Non-combat tasks such as procurement, maintenance, accounting and others were placed in the tail category.

Norway had the largest tooth-to-tail ratio, with its personnel breaking down as 54 percent tooth, 36 percent non-combat and 11 percent combat support. The United States was second-to-last with 84 percent of its personnel in non-combat or combat support positions.

The average was 26 percent tooth, 63 percent non-combat and 11 percent combat support.

The McKinsey report also notes that some nations, such as France, are attempting to bring about a "dramatic reduction of administrative personnel through investment in IT systems and outsourcing of certain non-combat operations to the private sector."

Keeping its focus on best practices, the report points to an unnamed "Northern European" nation that set out a few years ago to increase its tooth-to-tail ratio. When it started, this nation's military personnel were 40 percent tooth and 60 percent tail. The goal was a 60 to 40 ratio.

This nation met its goal, the report said, "by centralizing formerly duplicative support functions including [human resources], [information technology], finance, media and communications, health services, and facilities management."

This nation mapped "the functions' activities and resources - what exactly each function did, who did it, and how many people did it in each regiment - and by comparing itself with other public and private sector organizations, the defense ministry realized that centralization would yield savings of approximately 30 percent per function," according to the report.

On maintenance, the firm found a wide range on how much nations spend to keep their equipment running.

Adopting best practices in certain areas, Dowdy said, could save militaries "up to 60 percent."

One primary way to generate such savings, according to the report, is avoiding placing large numbers of uniformed personnel in nonmilitary jobs.

"Our experience working with a number of defense organizations indicates a 40 percent to 60 percent potential for increasing the quality and productivity of the maintenance, repair and overhaul (MRO) function without increasing costs," the report states. "We have found that the best-performing military

MRO organizations make smart use of outsourcing, excel at contracting, and constantly optimize their maintenance processes."

Dowdy said McKinsey researchers have been "testing" the study and its methodology for some time. The firm plans to present its findings to defense officials across the globe.

## RESOURCES

### WEB SITES AND NEWSLETTERS OF RELATED INTEREST

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**NSF Editorial Note:** A partial listing of government –sponsored sources that may prove valuable to the reader for information on space, space activities and how space is applied include the following:

- Air & Space Power Journal.....[airpower.maxwell.af.mil](http://airpower.maxwell.af.mil)
- Air War College Gateway.....[au.af.mil/au](http://au.af.mil/au)
- Muir S. Fairchild Research Information Center .....[au.af.mil/au/aul/bibs/space09.htm](http://au.af.mil/au/aul/bibs/space09.htm)
- CHIPS Magazine .....[chips.navy.mil](http://chips.navy.mil)
- Department of Defense Official Web Site .....[defenselink.mil](http://defenselink.mil)
- National Aeronautics and Space Administration.....[nasa.gov](http://nasa.gov)
- National Reconnaissance Office .....[nro.gov](http://nro.gov)
- National Security Space Institute.....<https://halfway.peterson.af.mil>  
(Access to .mil or .gov. computer required or contact [angela.garcia.ctr@afspc.af.mil](mailto:angela.garcia.ctr@afspc.af.mil))
- National Space Studies Center.....[space.au.af.mil](http://space.au.af.mil)
- Naval Research Laboratory.....[nrl.navy.mil](http://nrl.navy.mil)
- NOAA Satellite and Information Service .....[nesdis.noaa.gov](http://nesdis.noaa.gov)
- Thomas – The Library of Congress Online .....[thomas.loc.gov](http://thomas.loc.gov)
- U.S. Air Force AIM Points .....[aimpoints.hq.af.mil](http://aimpoints.hq.af.mil)
- U.S. Navy Office of Information .....[chinfo.navy.mil](http://chinfo.navy.mil)